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THE TEACHING OF ASTRONOMY.

(First Paper)

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[*Astronomy in the last few years has acquired a new status in the minds of thoughtful people. The recent and sometimes startling discoveries in this the oldest of the sciences have stimulated a very general interest in the things with which astronomy has to do. The colleges and universities are looked to, as they should be, as centers from which information concerning these new developments is disseminated. This is accomplished most readily through the students of the colleges and universities who have availed themslvs of the opportunities of study along these lines. The teaching of astronomy is thus brought into a place of prominence. It was thought, therefore, that it would be profitable to all concerned to have available the views of some of those who have met with success in this phase of work. We are greatly pleased, therefore, in presenting here the first of a series of papers on this general topic. It is hoped that this symposium will be found of interest and of value by the teachers of astronomy and that it may infuse, if needed, a new spirit into their work.* EDITORS.]

If a dozen of the leading teachers in any field were to get together for the purpose of discussing better methods of teaching their subject, it is more than likely that a dozen different opinions would be expressed as to the methods of its presentation. When, therefore, the editor of POPULAR ASTRONOMY solicits a series of articles on the teaching of Astronomy, we may welcome the general stimulation of interest in astronomical teaching which it may engender and know that at least as many ideas will be expressed as there are contributors.

One may well shrink from being dogmatic concerning methods of teaching astronomy and, indeed, were it not for the invitation to contribute, one would perhaps hesitate to express views which may have largely evolved through personal experience under local conditions. It is, however, the interchange of creative and constructive ideas that helps both art and science. Nothing kindles enthusiasm like the presentation of an old idea in a new way or the demonstration of phenomena by a new piece of apparatus.

Leaving aside for the moment the consideration of such topics as

astronomical textbooks (of which fortunately we now have some excellent re-creations), the place of lecture, recitation, and laboratory work, let us ask ourselves what place and purpose astronomy has in an academic curriculum, and how astronomical teaching can best be done to fulfil that place and purpose. Detailed suggestions as to specific problems in the presentation of the science may well be left for other contributions.

This is not the place for prolonged discussion of collegiate problems of a general nature, such as are occupying the attention of educators today the world over, but the day is passing when a teacher can consider his own subject as a thing of itself unrelated to the larger problems of the educational régime, whether his course be for general culture or primarily professional.

Taking the broader outlook one must examine the various subjects of the college curriculum from the point of view of general educational value rather than from the point of view of the specialist. In this scientific age one need not contend for the educational value of a course in science, but astronomy among the sciences has perhaps hardly occupied that position which it inherently commands as the parent of them all.

Poincaré has emphasized in his "Value of Science," that it is astronomy that first taught man the law and order of creation, and it was the untangling of mysterious movements of the heavens that hastened the early seekers after truth to believe that all physical phenomena followed the same immutable laws of antecedent and consequence, and that they were not the product of chance or caprice. Had man by some misfortune of nature been condemned to live beneath a perpetually cloudy sky, scientific progress might have been painfully slow indeed. But for the work of Copernicus, Tycho Brahe, Kepler, and Galileo, where would have been the foundation for the gravitational law of Newton? If astronomy had made no other contribution to physics than this law of Newton, it would have at least given to science what Whewell has called indisputably and incomparably the greatest scientific discovery of this age. And now when relativity is beginning to give us entirely new concepts of space, time, and gravitation, we find that it is again astronomy which has furnished the observational evidence for its wide acceptance.

To argue for astronomy from its material contributions to science is but to belittle the issue, for its educational value lies rather in its ability to stimulate a man's imagination, rationalize his thinking, and give him an appreciation of the large environment in which nature has destined that man shall play his part. No other science has so profoundly influenced human progress, for certainly no other has been so inwrought into the literature, the philosophy, and the religion of the human race as has astronomy.

In comparatively few institutions is its position comparable with physics, chemistry, or the natural sciences in fulfilling the science requirements of the curriculum. Yet as an exact science it affords opportunity for the same kind of training as physics and chemistry, and because of its comprehensive nature correlates all other sciences in its attempt to interpret the universe.

From the point of view of the correlation of the sciences, what better vista of human knowledge could be opened than that which astronomy can give? For the recent controversy over the doctrine of evolution, that has so unfortunately been exhumed, we have no better antidote than to reflect on the establishment of the Copernican theory. Here again we see astronomy as a correlator of knowledge, and the student of astronomy learns that the evolutionary conception of Darwin was but a necessary consequence of that vast process of inorganic evolution among the stars and planets, glimpsed a century before.

By the time this appears in print hundreds and thousands of students the country over will have attended their first meeting of *Astronomy I* (or its equivalent in other nomenclature). Instructors, if born optimists, will have sized up their new classes as of unusually good material; or, if given to chronic pessimism, will pronounce the group as surprisingly unintelligent in appearance.

While one astronomer may despair of any promising students whom he can allure with astronomy, an equally zealous enthusiast for the stars may see a class of students as the unwritten pages of a book on which may be written, not a textbook of astronomy, but the record of achievements of man's mind. Purposes and methods of instruction must to a great extent depend upon the possibilities and ambitions of the student.

Considering all the students beginning the study of astronomy this autumn as forming one big class, we can for convenience divide them, like all Gaul, into three parts.

If there are few prerequisites one can feel quite confident that the vast majority of students electing an introductory course in astronomy do so for other than professional reasons. This large body of undergraduates seeking a general education which shall comprise something of history, of literature, and of science, form the first and largest class of students we have to consider.

Then there is a comparatively small class of individuals who by temper and training are clever in science. From this class will come new recruits in astronomy and closely allied subjects. Such students are a delight to teach and will follow with pleasure technicalities of the professional field without appeal to the general student.

A still smaller class is represented by those rare individuals who exhibit extraordinary genius and fortunate are we if these average one to a college generation. Such an individual exhibits early a capacity for creative work which puts him in a class by himself. He needs the

facilities rather than the instruction of an academic institution. Aside from a certain measure of instrumental or laboratory technique, which may best be learned from experienced men, he needs little more than books and intelligent direction to original sources and he is on a career to scientific achievement.

At the outset one must insure that the machinery of education shall not stifle the genius. Too much time, attention, and expense have doubtless been devoted to mediocre students irresponsive to the appeals of scholarship. All too frequently perhaps real genius has escaped unnoticed in the tragedy of the standardized classroom. To this mistake academic institutions are beginning to awaken. Preceptorial and tutorial programs are the result. A growing appreciation of the English system pervades the educational world. At all odds let us encourage the exceptional man and not place the penalty of drudgery upon the scholastically able while we encourage indolence by alluring schemes to make easier the ways of the unambitious.

From this smaller class of creative students will come the leadership of the future. From this class will come astronomers who are to succeed us in reading the riddle of the universe.

We need to remind ourselves constantly, however, that not all of these will become astronomers or even scientists. The vast majority of even the most intellectually fit will get their only contact with astronomy through an introductory course.

Every creative worker is a debtor to his profession and nothing delights him more than to allure and train capable men for his own field of endeavor. Yet among the higher order, to speak biologically, but a small portion of the productive powers of the individual go to the reproduction of the kind. One can not expect less among creators of civilization whether in art or science. No, we can not expect—we would not desire—that a large proportion of students studying astronomy should become professional astronomers. The introductory course in this as in any other subject should be ordered with this in mind. The advanced courses in astronomy as in other fields, particularly the sciences, can afford to be more highly technical and be moulded more directly by the requirements of the professional worker. The introductory course on the other hand needs the broader background, the emphasis upon really fundamental principles which serve as the foundation of all science and the basis of all rational thinking. For the sake of the large proportion of students whose interest and inclinations have guided them to elect astronomy solely for its larger aspects, as a stimulus to the imagination and as an introduction to the most extensive problems with which the human mind can grapple, the beginning course deserves special thought and the best efforts of the instructors.

As is often maintained, the pure research worker absorbed primarily with technical problems in his own limited field may not necessarily be

the most desirable teacher of the introductory course, but on the other hand a teacher who is not a creative thinker and therefore in some measure a contributor to his own field can seldom impart that contagious enthusiasm and that confidence in the reality of his subject which comes not from borrowed knowledge alone.

The most important matter to keep in mind in the beginning course in science is the humanization of the subject. This means again that the point of view of the instructor should not be so much that of the professional astronomer as that of the general student, not of the mediocre or indifferent variety, but of the intellectually alert who is interested in his environment, the why and how of what is going on about him and the significance and meaning of nature to him as an individual whose measure of success in life will depend more upon his attitude toward his environment than his technical equipment.

To such a student astronomy should make a profound appeal. Great is the opportunity and great the responsibility of the instructor who is privileged to be the one to introduce such an inquiring mind to the universe of stars and lead the student to re-think the problems which it took certain of the best minds of all time to solve. Is it not by clambering over the trail which the pioneers themselves have blazed that modern youth can best see clearly how to blaze new trails ahead and surmount difficulties in our day no less forbidding than those which thwarted the course of men in the yesterdays of science?

For this reason, therefore, it seems to me that the formal lecture which narrates only the facts of astronomy, facts which may be culled from any good textbook or up to date encyclopedia, is of doubtful value except to relieve the student of looking the matter up for himself. On the other hand, nothing is more deadly than the textbook method of instruction, where assignments are followed by recitation to see if the student has read the assignment or has remembered what he has read.

A good memory may be a wonderful asset to many a student, but I often think it a curse for many others. So often a photographic mind is the enemy of intellectual effort. Those of us who have long been in the teaching game know how common is the experience of having a student give an entirely correct answer to a given question and then on further questioning show that he had failed utterly to grasp the rudiments of the problem. This is the peril of the recitation method, the bane of the education of the individual whose *modus operandi* is cramming!

How is this malady so common in all subjects to be corrected? By the inductive method of teaching; the project method of the elementary school, the case method of the professional school. To be personal for the moment for the sake of concreteness, I make it a constant practice to try to introduce each new subject in astronomy by a statement of the problem confronting the astronomers of a given age, endeavoring to

get members of the class to suggest some means by which it could be solved. Whether it is the question of the shape of the earth, the observed motions of the planets, the parallax of the nearest stars, or the measurement of the distance of a globular cluster, I make it a practice not to tell the class at once how it is done, but rather to lead them by suggestive questioning to tell me how the astronomers can go about it. Each new acquisition of knowledge becomes in turn a tool which they use for making further headway. The inductive method is the method of science. It arouses curiosity, stimulates thinking, is an antidote for memorizing and constantly prepares the student for a type of examination for which he can not prepare by cramming.

In carrying out such a scheme of attack I have found it preferable not to assign the textbook matter in advance. In this way there is always an atmosphere of curiosity, and stimulation to honest effort in thinking during the lecture hour. The textbook can then be read to supplement what has been developed in the classroom both as regards material and detail of treatment. Less time will have to be spent on the text so far as acquiring a first understanding of the problem, and the student will have a different viewpoint and more interest in reading up other supplementary material.

Concerning the use of lantern slides and illustrative apparatus in the lecture room for demonstrating fundamental principles one can hardly place too much emphasis. Nothing arrests attention and stimulates the imagination and powers of observation like well selected demonstrations of astronomical truths. Even diagrams and pictures of mechanical models are poor substitutes for the three dimensional apparatus. Furthermore the demonstration apparatus aside from illustrating and clarifying the point under discussion invariably will draw a group to the lecture table after the hour and the supplementary talk ensuing is often one of the most valuable educational assets to both pupil and instructor. Let one show a human interest in a student's reactions to what one is trying to put across and the student in turn will show more interest in the subject which captivates the interest of the instructor.

Actually perform the whirling hoop experiment to show the cause of the earth's oblateness (no diagram or picture will do the trick). The student will have a new appreciation for centrifugal force and why Jupiter does not look round in the telescope. Actually show the lecture room floor to be turning with respect to a free pendulum as the earth rotates. It may be demonstrated with simple apparatus to a class of a hundred in five minutes in almost any class room. Exhibit the laws of momentum, the precession of the equinoxes, the march of the seasons, configurations of the planets, eclipses of sun and moon, continuous, bright line, and dark line spectra, etc., with suitable apparatus (all of which is obtainable), and a student develops a new interest in nature and the place of the earth in the universe of which we are a part.

The wealth of astronomical slides available including reproductions of exquisite photographs with the world's best telescopes warrants a liberal use of the lantern throughout any introductory course.

Personally I think much is to be gained by not following too closely any single textbook. If the student gets the impression early that thinking about the subject matter is the all important thing and assignment in textbooks but a means to an end, he will have gained much of the spirit of the modern trend in education which can not be inculcated too soon.

So far as the order of material presented is concerned, much must be left to the individual reactions of the instructor.

Not long ago two of us were discussing the subject matter of a recent textbook as regards order and the method of presentation. My colleague, from a distant institution, remarked, "I sometimes wonder if the conventional order of arrangement of the subject matter in a textbook on astronomy isn't all wrong. Should we not begin with the stars, the universe, and then come down to the solar system and last of all the earth? Isn't modern astronomy vastly more interested in the enormous distances and the constitution of the stars which make up the galactic system than it is in the matter of the size, shape, and meandering of this earth of ours?"

There is a good deal of merit in this point of view. Habit, conservatism, inertia, all of these combine to make us present the subject-matter in the characteristic order in which it has long been arranged by the textbook writers of yesterday.

If one is to profit by educational psychology, a safe and sane guide to the introduction of any topic is to proceed from the known to the unknown, to depart from the familiar and explore the unfamiliar. A biological epigram reminds us that ontogeny recapitulates phylogeny, that the individual in his physical development passes successively through the several states of evolution which characterized the history of the race. If such is true physically may not the same give us a clue to the scheme of intellectual development of the individual? Can we not catch a picture of the *modus operandi* for teaching astronomy from a glance at the road over which the race has travelled in its conquest of the sky?

Glancing then at the story of the development of man's present knowledge of the stars, we see that to satisfy his curiosity and amazement at the heavenly bodies, he had first to learn through painstaking effort something about the size and place of the earth on which he lived before he could hope to understand even the workings of the solar system, our own immediate astronomical family.

Little by little as his store of information grew, his imagination guided by fact, has brought him to the threshold of the universe and star strewn space whose mysteries we have but just begun to disclose.

Only through a study of the logic and painstaking investigations of yesterday do I believe one can really learn to appreciate the achievements of science which have made possible the astronomy of today.

Next to the inductive method in the classroom, where of necessity a semi-conference atmosphere must replace the conventional scheme of the formal lecture, I regard the individual, observational and laboratory assignments as the most important feature in teaching astronomy.

To the vast majority of students no class discussion or lecture *en masse* can begin to educate a student to think like the presentation of the individual problem. This is the fundamental method of education in all nature; long before there were schools, the individual learned how to do things by doing them. It was the laboratory method. One can never learn to shoot, swim, or dive from the manual of arms or of aquatic sports, and the best of instructors are helpless without the material equipment for the individual experiment. One may get a certain amount of satisfaction from music or painting without being able to play a single instrument or sketch an orange free-hand, but one can never really learn to appreciate great music, or the achievements of the masters of art until with instrument or brush in some modest way he himself has solved some of the simpler problems in the production of music or delineation of form. So indeed to the extent to which one engages in methods of scientific observation and experiment will he learn to appreciate something of the method of science.

This is what the individual laboratory work and evening observations aim to do. These are some things which a college course can give which the individual is not likely to get in any other way. If we give our students only what they may acquire from standard books to be found in any public library, what does the college give in its courses over and above the information which the individual can readily acquire for himself?

Furthermore it is in connection with the observational and experimental work that the student gets something of the details of procedure in the solution of any scientific problem. If the laboratory work is properly supervised the instructor comes into intimate contact with each new student, understands his difficulties, and is ever on the alert to discover the unusual man and offer opportunities for such original work as the enthusiasm and ability of the individual will allow.

Astronomy is pre-eminently a science of observation. To learn it solely from lectures and textbooks and be ignorant of the stars is as great a misfortune as to learn botany by means of preserved specimens and be unable to recognize the wild flowers of one's own locality.

Too often, however, evening observational work is ineffective and desultory partly because of adverse weather conditions and partly because sufficient definiteness is lacking in the problem assigned. For

this reason the regular meeting of a section one evening a week, clear or cloudy, and the use of a carefully selected exercise adapted to the conditions has decided advantages.

In many cases much profitable work may be done in daylight as well as evening sections. In this way observational work on the sun and certain computational and instrumental work may be accomplished independent of the evening sky, thus conserving clear nights for naked eye and telescopic work with the stars and planets.

Small groups meeting regularly for laboratory exercises at stated hours offer opportunity for the discovery of aptitude for scientific work as well as training in individual thinking and technique of manipulation.

Objections are sometimes made and not without some foundation that the performance of set exercises is destructive of initiative and originality. I do not believe, however, that this need be the case. If rightly conducted, the laboratory problem becomes the occasion for original thinking and the wise instructor will seize every opportunity to use it to discover the creative mind.

The use of elaborate printed directions for astronomical exercises one must admit has a forbidding appearance from the point of view of initiative. One must consider, however, that an enormous amount of time and effort is spared both teacher and pupil if a method of procedure is clearly outlined. This saves hours of explanation and the doing over of work incorrectly laid out. Moreover, valuable time of the good student and fast worker is conserved while at the same time the less active mind can learn to work out its own solution without pestering the instructor with what to do next.

To be most effective the work of the laboratory and the subject matter of the lecture or classroom must be closely correlated, otherwise the laboratory work largely defeats its own end. If one is discussing in the class the motion of the moon or the planets and immediately thereafter goes into the open and with simple equipment observes the position of these bodies from night to night and then as a laboratory problem traces the path of the bodies in space, he gets a sense of reality and relationship in his stock of ideas not otherwise possible.

There is a double entry of the new ideas into the mind of the student which fixes them as only visualization will do. To discuss the construction of the telescope and then to proceed with a laboratory exercise on the optics of the astronomical telescope whereby with suitable lenses the student can gain through personal experience a conception of focal length, magnifying power, effect of stops and diaphragms gives one both an appreciation and mastery of the instrument which no number of textbook references or lantern slides alone can convey.

In discussing the sun let the student measure for himself even without great accuracy the diameter of our luminary, study the progress of spots both by means of the telescope and photographs, and determine

the actual period of rotation of the sun thereby. Only in some such way where systematic measurement leads to a tangible result will the student gain a personal appreciation of the way the scientist goes about things and at the same time get some picture of the hours of honest and painstaking effort necessary for one new grain of truth.

For purely qualitative work with apparatus or instruments I am not greatly enthusiastic. Whenever possible have the student *measure* something even if not with great precision. To be *shown* a phenomenon is interesting to be sure, but it is only when he comes to *measure* things that he begins to think quantitatively and accurately. The very act of measuring a quantity directs the attention and sustained attention is provocative of creative thinking.

Next to individual effort in the laboratory itself I regard the written report of greatest importance. Here is the opportunity for individual expression. When rightly done the laboratory report should be a finished piece of work of which the student may be justly proud. It should contain a resumé of the topic concerning which the laboratory exercise makes its contribution, and in this way its preparation serves the student as a review of the field of astronomy then under discussion. The report will state the bearing of the problem upon the main topic, just what the exercise in question aims to accomplish, what was the argument of the method employed, what apparatus was involved, how it was constructed and used, what was the degree of accuracy of the measurement and the final results obtained, with perhaps a comparison of more precise results obtained by professional workers.

Such work conscientiously done throughout the year introduces the man in the introductory course to the methods of investigation and research in a variety of fields in astronomy, only one of which might be touched were he assigned to an exhaustive investigation of some one problem the results of which in an elementary course might or might not be of professional research value. In any introductory course it seems to me that students should be brought into touch with as widely different aspects of the subject as possible. Again we must bear in mind that certainly ninety percent of those electing it will never become astronomers. To many of them the elementary astronomy course may be their one and only introduction to science.

To summarize: the educational value of astronomy lies in the extensive scope of the subject matter and its ability to correlate and interpret the other sciences. Advances in teaching the subject point the way to a greater humanization of the introductory course, more attention to the spirit of the inductive method, and a renewed emphasis upon the systematic observational work in the laboratory and at the telescope.

When so conducted a course in astronomy merits a standing with physics, chemistry, or any of the natural sciences as to its educational value in the curriculum. It has the additional advantage that the scope

of the subject matter introduces a student to a domain of thought not equaled by any other science. A student, who has fairly glimpsed the picture of the universe as modern astronomy reveals it, carries with him impressions which persist long after the terminology has gone. The stars once learned are his friends forever. May we not hope that by the co-operative effort of those interested in the teaching of astronomy there shall arise new recruits not alone in the fields of stellar research, but who, regarding the teaching profession in itself a high calling, shall find a new stimulus in the creative work of interpreting the universe to growing minds.

STUDENTS ASTRONOMICAL LABORATORY,
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THE TOTAL ECLIPSE OF 1927.

By S. A. MITCHELL.

American astronomy was represented in Norway by two parties. Professor Frederick Slocum was at Aal with four cameras of different focal length attached to a heavy polar axis. A large expedition was at Fagernes in the Valdres valley. On eclipse day, twenty persons took part in the McCormick-Chaloner program—or rather, they would have, if the skies had been clear.

The weather seems always to be "unusual" at the time of an eclipse. This year was no exception. The spring in Norway had been very late. When we arrived in Fagernes on May 23, there was still much snow in the woods and early spring was just beginning. Usually the weather turns much warmer in June, the skies become much clearer and best of all the clearest part of the day is always to be found in the early morning. As totality was to take place at 6:34 A.M., this sounded very promising. But unfortunately, the unusual happened, the warm weather refused to come to drive away the clouds, with the result that the day of the eclipse was preceded by fourteen days of more or less continual clouds, with nine days of rain. It did indeed look hopeless, yet sometimes miracles do happen, such as that which befell the Lick party in 1918. We tried to keep a stiff upper lip and be optimists, but luck was not to be ours at Fagernes. The same fate awaited Professor Newall and the Cambridge party at Aal.

The miracle that did actually come to the rescue of the Astronomer Royal and the party from Greenwich is best told in the following lines copied from the *London Times* of August 3.

CLOUDY, SOME RAIN.

A few weeks ago Giggleswick leaped into fame. It had long been known to a few as a charming old moorland village, where

there was a small but excellent public school. On June 29 it became celebrated all the world over as the place where quite a large number of people saw the sun from English soil. It is true that the object was completely covered by a thick black shadow; but not only those who were at Giggleswick at that unique and ever-memorable moment were ready to take the word of science that the thing behind that shadow, making an uncertain display of light on its edge, was indeed the sun. The incredible had happened. The impenetrable veil of cloud which year in and year out, whether days are long or short, hides the ether from the eyes of people on this island, had been proved to be penetrable after all. The existence of the sun could henceforth, without merely childish or savage credulity, be taken as empirically proved and not merely susceptible of proof from calculation and deduction. And there was even ground for a reasonable hope that the phenomenon may occur again—that some day (though even the hardiest astronomer who chats with the inhabitants of Mars would not be so rash as to fix the date) the sun will again be visible from England.

At the same time there is need for caution. We must not be too ready to believe in the good fortune of our descendants. The existence of the sun has, of course, long been suspected. Travellers have even boasted that, in other countries, they have seen it; but no prudent person believes travellers' tales any more than fishermen's or the flattering tales of hope. So-called evidence is produced; and the arrangement of the monoliths at Stonehenge is cited as proof that our distant ancestors had seen the sun rise. The argument would be too slight to rest upon, even had it not been calculated by indubitable mathematical law that on Midsummer Day the sun (if it rose) would not rise precisely at the point indicated by the stones. Others appeal to the literature of the past. In an ancient poem occur the difficult lines:—"When the coster has done jumping on his mother, on his mother, he loves to lie a-basking in the sun." The archaic form "a-basking" is enough of itself to prove that the passage must date from an ignorant and unscientific age; and it is generally acknowledged by students that the favourite method of this poet was to proceed on strictly probable lines from manifestly impossible postulates. Gilbert, in fact, can no more be accepted as an authority for the existence of the sun than can Lewis Carroll as an authority for the existence of the Mock Turtle, the Borogrove, and the Dodo. It is not to be expected that scientific caution will quickly erase from the popular mind all traces of an old and persistent legend. Some people still believe that the earth is flat, that the English are the lost tribes of Israel, that King Louis XVII lived to manhood in Flanders, that Arthur Orton was Sir Roger Tichborne, that King Arthur sleeps till Britain's need awake him, and that Joanna Southcott's box will save her country. Happily, should the Giggleswick hope have to be surrendered and the sun finally classed with Mrs. Harris, no practical inconvenience will follow. There are cosmetics which produce the pleasant tint prettily called "sunburn"; and an electrical

treatment, fancifully named "artificial sunlight," can do for health in three or four minutes what the sun (if any) might do in three or four hours.

THE ASTRONOMICAL FRATERNITY OF THE WORLD.

By DAVID B. PICKERING.

PART III.

In strong contrast to the damp, chilling discomfort that we had experienced during a continental springtime, London, in mid-June, gave us our first touch of real summer. Under a glorious sun that raised the thermometer to 70 degrees and caused our cold-blooded English cousins to parade sandwichmen whose placards told of the "terrific heat wave," we rambled from our snug quarters in Queen's Gate, in and about the museums and monuments of that old quarter where Thackerey lived and dreamed; through beautiful Kensington Gardens and Hyde Park—watched the Sunday parade along Rotten Row and listened to the soap-box orators at the Marble Arch.

A wildly flying electric fan above our dining room table, striving its simple best to keep the blood of the English diners at its customary low temperature, brought me down with a miserable, feverish cold. During this period we received an invitation from the Secretary of the British Astronomical Association to attend the third and last session of the Society at Zion college—"after tea on the terrace." With sorrow we sent our regrets—since the doctor had refused to allow me to leave my room. How we should have relished meeting those good people, whom we had never seen, but of whom we had heard so much—but fate, in the form of a fan, decreed otherwise.

On the following Sunday afternoon, however, we were delighted by a call from Mr. W. Alfred Parr, the genial librarian of the B.A.A. Dr. and Mrs. Abetti—whom astronomical visitors to Florence ever after refer to as "those dear Abettis"—had spoken with such enthusiasm of Mr. Parr that we had keenly anticipated meeting him, and as we sat at tea together and talked of people, places, and plans, and of the work of our respective societies, we heartily agreed with the Abettis in their estimate of this fine English gentleman. Mr. Parr's son, newly graduated from Cambridge, was about to make a trip into Germany with his father, and our hopes of soon visiting that country made the latter's recital of their plans doubly interesting.

When later we visited first Cambridge and then Oxford, we recalled vividly Mr. Parr's warm description of his son's Alma Mater. As we rambled for the first time through the by-ways of those ancient seats

of learning, realizing how immense had been their influence, through many centuries, in making England England; and in developing that high standard of culture that is so prominently emphasized in the English gentleman, we looked upon our experience as a real adventure. We seemed launched upon a sea of dreams, where reality was something hazy, seen through the mists of old adventure and doughty deed. Ghosts of the Great appeared to be lurking in each nook and corner of those ancient edifices, and wraith-like we visualized historic scenes at every turn of the narrow, lane-like streets of those sacred towns.

About two miles out from the clustered colleges of Cambridge, through sweeping hay fields and beyond stretching hedge-rows, the University observatory nestles among its grove of trees. Just the tops

FAÇADE OF THE CAMBRIDGE OBSERVATORY.

of its low domes can be seen afar across the rolling meadows. Its buildings are rather humble affairs, compared with those of our great modern observatories, but their contents are rich in valued historic instruments. We had long hoped to surprise (the word is carefully selected) in this quiet retreat, the man who unquestionably holds a position very near the top in the astronomical world, whose name the groping amateur lisps with reverence and awe and whose printed work is largely beyond the latter's comprehension. But we learned, alas, that even genius requires an occasional holiday and that Professor Eddington was on his vacation.

So also was Professor John Carroll, head of the solar-physics department. We were compensated, however, by the courtesy of Dr. Smart, Adams Professor of the observatory and co-worker with Professor Eddington in most of his investigations. Despite the fact that this gentleman was about to silver some mirrors, he left them—in what state of critical preparation we know not—to act as our guide about the grounds and in and among the many buildings, telling the while the story of the

various instruments and their achievements. It was the oft-repeated observance of such graceful acts as this, that brought home to us the big outstandin gfact that, as Americans, we seemed to have lost or discarded an important virtue. Taken as a people, by and large—for there are still some civilized astronomers, even in America—the rather selfish push and hustle that have placed us ahead in worldly accumulation, living comforts, and the development of material things generally, have resulted in a great measure in our loss of courtesy and those other genial qualities that give charm to the manners of the European. It was this that made conspicuous the graciousness of all the English people whom it was our good fortune to meet. The members of the Cambridge observatory staff have their cottage homes amid the shrubbery and flowers of the garden, but a step from the main building. Now from behind a great screen of hedge appeared the tear-stained face of Dr. Smart's chubby three-year-old son. He had bumped himself while playing, but we dried his tears and stood him up with his father to be photographed against a background of crimson ramblers. Later we met Mr. Moss, an assistant to Dr. Carroll, who exhibited the instruments used in solar research including the great horizontal spectroscope. As we walked down the long straight driveway upon leaving, we looked back between the huge bordering hedge-rows to the low classical portal of the main building, framed by the overhanging branches of adjacent trees, and were strongly impressed with the quiet, pastoral environment of this institution that has given the world such wealth of celestial knowledge.

We had looked forward with great expectation to the pleasure of meeting Professor Turner of the Oxford observatory. Of no one had we heard more flattering things, for everyone seems to love him. But it was not to be. We seemed to have selected, unwittingly, the season in which English astronomers take their vacations. We were fortunate, however, to come under the guidance of Mr. J. S. Hughes, the young seismographist of the observatory. With him, we inspected the various instruments—the largest of which is a mirror of about 15 inches—visited the student lecture rooms and saw the many smaller portable telescopes used by the scholars. Much time is given to teaching at the Oxford observatory, unfortunately limiting that which may be devoted to research. As at Cambridge, the country about Oxford is quite flat, the observatory being situated just at the edge of the town on the side of some sweeping downs where athletic games are held. It is an attractive site, suggestive of snugness and coziness; the air full of bird-calls from the surrounding trees and hedges and in the distance, the vista of turreted towers and ancient spires. To arrive here from the turmoil of the great metropolis was to come to a spot of tranquility and rest, and we wondered where Professor Turner could have gone to find a more reposeful retreat.

Very early one morning, we made the short train trip from London to Kingston; thence by boat up the beautiful Thames to Windsor. All on a day of high white clouds, in the month of roses—English roses. We sensed the feeling of being again in the Mother-land—after an exile of over four hundred years—and something within us kept singing "back home" as we wound with delightful leisure around innumerable verdure-banked bends through a land both picturesque and rich in historic interest. Soon many chimneyed Hampton Court appeared on our right and later, above the little town of Egham, we glimpsed the level meadow of Runnymede where Magna Charta was sealed by King John in 1215. Through lock after lock, past sumptuous house-boats, between shore cottages massed from base to chimney-pots with crimson ramblers, until at last we caught the distant view of the gray walls and

OXFORD OBSERVATORY.

towers of Windsor castle. After passing under Windsor bridge, we disembarked and spent the night at the White Hart Inn—under the very shadows of those gaunt piles that have housed so much majesty. Next day to the river again—now to cross the bridge to Eaton and visit that famous institution where British character was being developed in British youth, half a century before Columbus made his well-known excursion. Here the original schoolroom is still in use and it is difficult to find a space on wooden wall or furniture without its carved name. Reverently we were shown the great book—a sadly beautiful thing of gold and glory—in which are recorded the names of the five thousand Etonians who marched away to the great war; fourteen hundred of whom were never to march homeward again.

Outside, on the shaded street corner, a lone sign-board bore the single word "Slough," and a staid old bus took us thence. As we traversed the few intervening miles, our minds reverted to the days of the Third

George and of that other great Hanoverian who lived and worked at Slough in order to be near the residence of his royal patron. Long since, the world has come to know how great his work really was—and how paltry the patronage of his majesty.

We left our conveyance at the railway station, from which a few minutes walk, through quiet side streets, brought us to the brick house which is the hereditary home of the Herschels. Here came Frederick William Herschel, the musician of Bath, in 1786, and here now reside his three granddaughters, one of whom—neither the oldest nor youngest —is especially interested in the fame and accomplishment of her splendid grand-sire, and was soon to prove herself not only a charming hostess but a very kindly friend as well.

A trim maid ushered us through the house to the spacious garden in the rear, where we elected to spend the few minutes before Miss Herschel could see us. A central lawn stretched before us for perhaps one hundred feet bordered by tree-shaded paths which wound in and out of the surrounding shrubbery. Almost at once we glimpsed at the far side, half hidden by bushes, a huge black cylinder—the relic of a famous masterpiece—the proud remains of what, a century ago, was the greatest astronomical instrument the world had ever known: The "Forty-foot telescope." Facing the garden, to the left of the residence, stood a separate edifice of brick, which proved to be "Observatory House" and which we were soon to find contained most of the scientific relics of Sir William and his famous sister, Caroline. Between the two buildings ran a low shed, beneath which we discerned the full length of the earlier, but less beloved, "Twenty-foot telescope." In the center of the garden, quite alone on the circular grass plat, lay a curious thing which we finally determined could be nothing else but the vertebral bone of a huge leviathan. We later found that upon the margins of all Sir William's drawings—carefully executed designs of buildings, mountings and instruments of which he made many with pencil—appeared a sketch of this identical heirloom. It must have been a rare and highly prized relic even in those far gone days—this bleached bit of whale bone. But now came Miss Francesca Herschel. As the dear, little old lady approached us she was quite aflutter with excitement; she held a book in her hand, which proved to be an American publication, and almost in the same breath with which she warmly welcomed us, she indignantly berated the author for hinting—as several of his historians have done—that F. W. Herschel, at the age of nineteen, left the German army a bit too abruptly and came to England. She begged us, as Americans—dear, loyal soul that she is—to see those publishers and acquaint them with the fact that she had in her possession, as she afterward showed us, very real and authentic documents from both the German and English governments honorably discharging Frederick William Herschel from military duty. Furthermore, she showed us the

splendid life of Sir William, done by Dr. Dyer at the instigation of the Royal Society, wherein he sets at rest those disquieting echoes from the past. To visualize Miss Herschel one must think of lavendar and tea and English hedge-rows; of quaintness and daintiness, but also of vivacity and loquacity, for this charming little lady is full of action and enthusiasm—evidencing a laudable pride in the greatness of her grand-sire. She took us at once to Observatory House—the two-storied brick building which had been both laboratory and work shop—wherein the instruments of research were fashioned by that tireless seeker for truth and his faithful sister. The temple of dreams, wherein

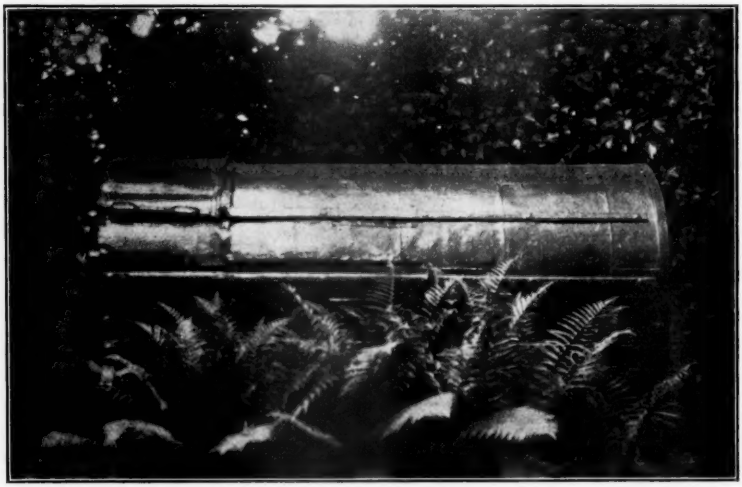
OBSERVATORY HOUSE OF SIR WILLIAM HERSCHEL (*right*), TUBE OF ORIGINAL 20-FT. TELESCOPE UNDER SHED (*left*).

genius, that was to awaken the world, expanded and developed. What an example was the elder Herschel's life, of the exhaustive physical labor that such a one employs to make his dreams come true! One cannot think of him alone, during these dawning years of greatness, but must see, ever at his side, that devoted sister, Caroline; nor is it easy to place this great sister of a great man upon a lower plane than himself—not only because of her individual achievement as an astronomer, but also for her constant aid in each of her brother's mental and physical activities and for the continuous record of their joint accomplishments which she so faithfully kept and which became, at once, a biography and a history of constant scientific progress. Needless to

say we approached this quiet retreat with almost religious awe. At our side, Miss Herschel was telling us that originally the building had been of three stories and when or how the upper one had been removed, no one knew. The furnishings and their arrangement were, as far as possible, as of Sir William's time. In the main room was the old-fashioned rocking-chair of Caroline, where she had sat to write the records and memoirs which have made such a golden page in history; and here were the very records themselves—stacks of blank books such as children took to school in the old days, filled with the neat, careful writing of this wonderful woman. How eagerly we scanned page after page of those priceless things—seeing the original of much that we had read beyond the sea, in the depths of printed volumes. Another room contained many of the smaller instruments and lenses—objectives and oculars—made by Herschel. And here we heard of the graceful act of a big and kindly man. Through decade after decade in the past, these precious things had been largely lost track of; speculum mirrors, large and small, minute eye-pieces, all were scattered about—some hidden away in barns and out-houses, others in garrets and cellars—without order or number. The dear old ladies, who in 1887, after an absence of years, had returned to the ancestral home, were quite hopelessly bewildered at the confused state of things. Then, in 1923, came a good Samaritan from London, in the form of Dr. W. H. Steavenson—whom later we had the delight of meeting—a man with the soul and mind and heart of a real astronomer. Figuratively he pitched in with his sleeves rolled up. He collected and cleaned these precious things. He arranged, numbered, and catalogued them, and out of chaos brought order and system—and after long labor, probably went quietly on his way with that lovable, quizzical smile of his. Please imagine Miss Francesca's enthusiastic recital of this kind act, and her beaming pride in the splendid array of treasures which now she could display with a facility, formerly impossible. There they were, from two of the great mirrors for the forty foot telescope (the original one having mysteriously disappeared) down to the smallest ocular—a tiny lens, one-one hundred-tenth of an inch in diameter. This latter was almost lost by the good Doctor during the period of renovation—it slipped from sight while being handled and, almost too small to be seen, was recovered from the surrounding articles, among which it had tried to escape, only by the sense of touch and after a long search. It is now mounted in a sizable wooden container that can not so easily go astray. There was also the speculum for the twenty foot telescope, in the very tin box whose lid had once been soldered on by Sir William himself. And the drawings of those huge, crude pyramids of wood that formed the mountings for the big telescopes; and others of Observatory House itself, showing its third story, now so mysteriously disappeared. And in the lower foreground of each was sketched the vertebra of the whale.

We came out into the dull London weather and strolled about the

garden. Miss Herschel showed us where, on the large central plat, had been unearthed the great brick circular base on which rested the mounting for the forty foot giant. Here on the ground lay a metal disk, whose curved surface indicated that it had been used as a grinding instrument for the great mirrors. As we approached the big tube, we were told that long ago, as it lay in its last resting place, a tree had fallen across it, crushing half its length, so that but about twenty feet now remain. At Miss Herschel's direction, we unclasped the heavy hinged end-cap and saw, pasted on the inside, a printed copy of the famous song, written by her father, Sir John Herschel, in 1840, to



REMAINS OF 40-FT. TELESCOPE, IN THE GARDENS OF OBSERVATORY HOUSE, SLOUGH, ENGLAND.

celebrate the fiftieth anniversary of the telescope's construction. In fulfilment of the hope expressed therein, Miss Herschel had written on the sheet; "We were here—1890."

"THE HERSCHELIAN TELESCOPE SONG.

Requiem of the Forty-feet Reflector at Slough, to be sung on the New Year's eve, 1839-40, by Papa, Mama, Madame, and all the Little Bodies in the tube thereof assembled:—

In the old telescope's tube we sit,
And the shades of the past around us flit;
His requiem sing we, with shout and with din,
While the old year goes out and the new one comes in.

Chorus of Youths and Virgins.

Merrily, merrily, let us all sing,
And make the old telescope rattle and ring.

Full fifty years did he laugh at the storm,
And the blast could not shake his majestic form;
Now prone he lies where he once stood high,
And searched the deep heavens with his broad bright eye.
Merrily, merrily etc.

There are wonders no living wight hath seen,
Which within this hollow have pictured been;
Which mortal record can ne'er recall,
And are known to Him only who makes them all.
Merrily, merrily etc.

Here watched our father the wintry Night,
And his gaze hath been fed with pre-Adamite light;
While planets above him in mystic dance
Sent down on his toils a propitious glance.
Merrily, merrily etc.

He has stretched him quietly down at length,
To bask in the starlight his giant strength;
And Time shall here a tough morsel find,
For his steel-devouring teeth to grind.
Merrily, merrily etc.

He will grind it at last, as grind it he must,
And its brass and its iron shall be clay and dust;
But scathless ages shall roll away,
And nurture its frame in its form's decay.
Merrily, merrily etc.

A new year dawns and the old year's past,
God send us a happy one like the last,
A little more sun and a little less rain,
To save us from cough and rheumatic pain.
Merrily, merrily etc.

God grant that its end this group may find
In love and harmony fondly joined;
And that some of us fifty years hence, once more,
May make the old Telescope's echoes roar.
Merrily, merrily etc."

It was not until Lord Rosse built his great telescope sixty years later, that the forty-foot tube was eclipsed in size. Much has been told and written of the journeys through the tube, before the mirror was installed, by famous visitors to Slough. The mind of the man of that day, thinking of telescopes in terms of a few inches aperture, such as those of Galileo and Newton, marveled at one in whose tube a man could move about. One famous report recites that King George III was among those whose curiousity impelled them to "take a walk" through the tube; he was followed closely by the Archbishop of Canterbury, who had difficulty in progressing; the king turned to give him his hand saying, "Come, my Lord Bishop, I will show you the way to Heaven."

There were further anecdotes to hear and pictures to look at after we had entered the house. What a pleasure it was to see the face of our new friend aglow with interest upon receiving news of her friends in America.

We left her at last—with her treasures and her dreams—her quaint

little form framed by the door-way of the hospitable home wherein the spirit of Memory so vividly recalls those stirring days of the past.

Slough was strongly in our minds next day, as we traveled by bus to Black Heath, there to visit Mr. and Mrs. Gerald Merton and to have our first sight of that ancient center of Time, which stands so majestically on the dividing line of the world: Greenwich Observatory. What memories of Dickens were revived, as crossing Westminster bridge we drew away from Big Ben and the Houses of Parliament; past the Old Kent road and then, after an hour's climbing and winding through distant, crowded suburbs, came to that high clearing which was quite what we had always imagined an English "Heath" to be—bare and bleak and rolling—and strangely enough, remaining so, in the midst of its surrounding habitations, for no apparent reason in the world. To the left, as we approached, ran the high board fence—"hoarding" the English call it—which enclosed the beautiful park-like grounds of the observatory. Around a corner to the left, standing shyly alone at the side of the Heath, is the little triangular fenced plot which contains the cozy home of the Mertons. Some years ago, several members of the A.A.V.S.O. began corresponding with Gerald Merton, whose great interest in the variable star work of the B.A.A. gave him a kindred interest in our own endeavors, and this helpful intercourse formed an important tie with our fellow workers beyond the sea. As we drew nearer, we saw the mounting of his six-inch mirror, standing in the center of the shrubbery garden and a moment later, there was Gerald himself and his charming wife to welcome us.

He is a big, rosy, round-faced, curly-haired young fellow with low musical laughter in his voice that bespeaks an ample sense of the humorous. He has a passionate interest in anything and everything related to science; is an omnivorous reader, with a power of concentration that could not be broken if the house were burning down about him—as many of his wife's anecdotes attest. And she—his better half—born of French and Irish parents, has inherited the instinct for cordial hospitality of the former and the brilliant wit of the latter The goodly luncheon at which we were presently seated was a very merry thing indeed. All about the cottage at Black Heath are evidences of Mr. Merton's versatile interests; radio sets, cameras, lenses, and books. He is a Cambridge man—Trinity College—from whence, long ago, came those other English lads—Newton, Macaulay, Byron, Tennyson, and Thackeray. And here he is on the staff of the Greenwich Observatory, completing the final requirements for that coveted Ph.D. In the midst of the luncheon there literally burst in upon us a slender, dark, vivacious man—a dear intimate of this little family and Gerald Merton's friend and co-worker—Dr. W. H. Steavenson—none other than he who did that big thing at Slough—and what a host of other big things he has to his credit. He has edited and contributed much to that

delightful and most comprehensive work "Splendor of the Heavens"—which every star-lover should own, if he can procure it—since the first edition, I believe, has been exhausted. He works nightly with almost machine-like precision observing variable stars with the great 28-inch refractor at Greenwich. Incidentally, he was elected to the Presidency of the B.A.A. And this man so strongly felt the urge of astronomical investigation, that as an amateur he took up the study and practice of medicine in order to make possible the pleasure of continuing his hobby.

MRS. PICKERING, DR. STEAVENSON, MRS. MERTON, MR. MERTON,
BLACK HEATH, LONDON.

After luncheon came one of those rare periods where men, deeply interested in the same subject and who, as far as they know, may never foregather again, all try to talk at once, indulging excitedly in an electric exchange of comment relative to the subject nearest their hearts. We discussed the progress and methods of variable star observation—instruments and charts, men and observatories—analysing the relative results of the work of the British and American societies, and concluding finally that they really complemented each other in a great degree. The Variable Star work of the B.A.A. has always maintained a very high standard of quality. With traditional British thoroughness, a few persistent observers with a limited list of stars, drawn largely from the ranks of the old, well-known regulars, have discussed and re-discussed their characteristics until it might well seem that the

last word had been said. The A.A.V.S.O., on the contrary, has adopted a very comprehensive program which includes the observation of all types of long period Variables by scores of workers. This, while it results in the accumulation of an immense amount of data, is, alas, too great numerically to admit of so exhaustive a discussion of individual stars as is done abroad.

Surely the amateurs of each Association wish the others well in whatever feature of the work they excel, and sincerely feel that each society should be an inspiration to the other. We, on this side, are endeavoring to reach fuller conclusions and formulate more finished reports of each star's peculiarities; while they, I know, are keen to extend the numbers and types of Variables and augment the number of their observers. The friendliness of the rivalry makes for common cause and so universal an interest readily surmounts national barriers.

A modest fence-door opening into the observatory grounds is just a step from the Merton's garden gate. There seems always to be a glamour in the first sight of famous things or places which accounted for the feeling of awe with which, after entering, we traversed the path that led to the portal of Flamsteed House—the old building, to which in 1675 came John Flamsteed who as first Astronomer Royal, strove to pierce the mists of scientific obscurity. If we still feel some indignation at the thought of the manner in which Herschel was treated by his royal patron, what shall we think of the predicament of poor John Flamsteed, who received from the government, under Charles II, the sum of 100 pounds per annum, and was forced to enter into Holy Orders to make both ends meet. Within the building we were shown the ancient instruments—great quadrants and many of the older telescopes. One large, central room is constructed with huge windows—used, long before the age of domes—to give a great clearance of sky area. From here we gazed down at London, picking out the Tower and the Parliament Houses and the famous bridges of the Thames. In this and other buildings, we were shown the old and new clock drives—the instruments for the accurate recording of time—splitting the second to its thousandth part—and dropping the big black ball which surmounts Flamsteed House, giving the world its standard time—Greenwich Mean Time—the familiar G.M.T. of all our records.

In our rambles from one to another of the many interesting departments, we approached the computing room of a famous mathematician who stepped outside to meet us. This was Dr. Crommelin, whose low, soft voice greeted us kindly and his keen, bright eyes sparkled with interest—belying the grizzled beard of age—as he inquired for his astronomical friends in America.

We saw the splendid 28-inch Grubb refractor and the large mirror, used by Dr. Steavenson and Mr. Merton respectively, and came at last to the office of the Director. Here we were graciously received by that

sturdy, four-square, smiling Englishman who controls the destiny of this great institution: Sir Frank Dyson. He was much interested in the remarkable opportunity we had for viewing the solar eclipse of January, 1925, and showed us, hanging upon the wall, a scenic photograph of it, which Mr. Merton, I think, had received from Wm. Tyler Olcott. There hung also, many portraits of his famous predecessors.

FLAMSTEED HOUSE, GREENWICH OBSERVATORY.

As he strolled with us, out into the garden, he inquired particularly for Dr. Shapley and Professor Brown of Yale, at last bidding us adieu at the tall door in the fence. We stepped into Merton's garden to get some snap-shots for remembrances before saying good-bye. But there is little need of pictures to keep green the memory of such a meeting.

I still glow at the thought of the warm welcome and the generous hospitality they so cordially extended to us, with their true English big-

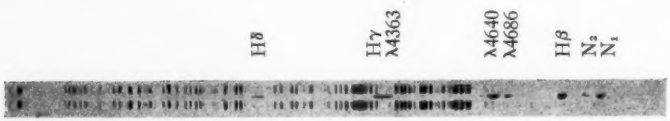
heartedness, and still chuckle at the flashes of brilliant repartee of our vivacious hostess and thrill with the recollection of our animated exchange of ideas.

Again, the enthusiasm for a common cause had left no ice to be melted—there was no precious time wasted in "getting acquainted"—members of the same great fraternity, we clasped hands, opened our hearts, spoke our minds and one, at least, went on his way happier and wiser than he came, with the feeling that time can never quite erase the memory of that one English summer afternoon.

NOVA AQUILAE 1927.

By OTTO STRUVE.

The accompanying slit-spectrogram of Professor Max Wolf's recent Nova in Aquila [α 18^h 52^m 6^s; δ —3° 25′ 10″ (1925)] was obtained, at the suggestion of Professor Edwin B. Frost, with the one-prism Bruce spectrograph of the Yerkes Observatory. A new camera lens designed by Dr. G. W. Moffitt and having a focal length of 5.63 inches ($f = 2.7$) was used. The scale of the original negative was 127A per mm at λ 4500. The exposure time was 4^h 15^m on September 5.16 U.T., 1927. The identifications of the principal emission bands are shown in the reproduction. The relative intensities are brought out by the microphotometer tracing made by Mr. C. T. Elvey at this Observatory.

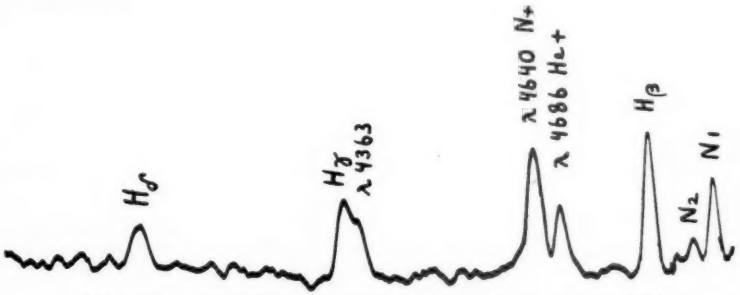


THE SPECTRUM OF NOVA AQUILAE 1927 ON SEPTEMBER 5.16 U.T. 1927.

The definition given by the Moffitt camera-lens is very satisfactory. For obtaining the best possible results it is necessary to determine the focus of the camera with great precision. A few hundredths of a millimeter are sufficient to throw the plate entirely out of focus. Under such conditions we have found it necessary to use a plateholder specially made of steel, in which the plate is pressed into the focal plane by means of a screw. In this way it is possible to avoid difficulties arising from the curvature of the glass.

The nova seems to have reached the "nebular" stage of its development. The spectrum shows all the characteristic emission bands, including the first and second bands of nebulium at λ 5007 and at λ 4959. On an Eastman 40 plate and with the usual focus-setting of the 40-inch

telescope the strongest emission band is Hβ; λ 4640 is decidedly weaker, while Nebulium I is third in intensity. The comparatively strong emission at λ 4686 is peculiar. An absorption line seems to be present near its violet edge. Another narrow absorption line is suspected in the center of bright Hδ. On the composite band Hγ and λ 4363 there are at least two absorption lines visible with certainty. The details of the measurements against the titanium and iron comparison spectra are tabulated below.



MICROPHOTOMETER TRACING OF SPECTRUM OF NOVA AQUILAE 1927
(1927 SEPT. 5.16 U.T.).

The photographic magnitude of the nova was determined by Professor W. H. Garrett as 9.4 on August 21 U.T., 10.0 on September 2 U.T., and 10.1 on September 4 U.T. The photovisual magnitudes for the same dates were 9.2, 10.1, 10.4. My own visual estimate in the finder of the 40-inch telescope was 10.2 on September 1 and 2. The nova had a distinctly reddish color. This seems paradoxical if contrasted with the negative color-index found by Mr. Garrett on September 2 and 4. However, the yellow filter used by him for the photovisual magnitudes does not transmit Hα. The red appearance is thus almost certainly due to a strong emission band at Hα, with little or no radiation from the yellow part of the spectrum. The last determination of the photographic magnitude of the nova, made by me with the 24-inch reflector on September 17.07 U.T., gave 9.8, while the visual estimate was 10.0. This indicates a slight brightening up at the present time.

Professor Shapley stated in Harvard Announcement Card 31, that objective prism plates taken with an 8-inch telescope on August 16 and 17 showed λ 4640 strongest. Provided that the emulsion used was of the ordinary photographic type similar to Eastman 40 (used here), the character of the spectrum has changed between that date and the date of our exposure. Two earlier spectrograms were obtained here with shorter exposures on September 1.13 and September 2.15. There is no evidence of change between September 1 and September 5.

A direct photograph of the field of the nova was obtained with the 24-inch reflector on September 17.11 U.T. with an exposure of 90

minutes. There is no trace of nebulosity around the nova. However, it falls near the edge of a region of very low star-density in the Milky Way.

Violet Edge	Red Edge	Emission Mean λ	Absorption	Probable Origin	
4090.7	4112.8	4101.8	4101.8	Hδ	4101.7
4332.6	4351.2	4341.9	.....	Hγ	4340.5
.....	.....	.....	4352.5	?	
.....	.....	.....	4358.2	?	
4363.0	4375.8	4369.4	.....	Neb. ?	4363
4584.5	4616.4	4600.4	.....	Neb.	4605
4621.6	4658.9	4640.2	.....	N+	4640
4673.3	4696.2	4684.8	4670.5	He+	4685.8
4707.4	4721.2	4714.5	.....	Neb.	4712
4850.8	4876.3	4863.6	.....	Hβ	4861.3
4913.8	4934.6	4924.2	.....	He	4921.9
4947.5	4971.0	4959.2	.....	Neb. II	4958.9
4995.3	5022.7	5009.0	.....	Neb. I	5006.8

YERKES OBSERVATORY, SEPTEMBER 18, 1927.

AN OPPORTUNITY FOR AMATEURS TO VIEW AND STUDY NEPTUNE.

By RUEL W. ROBERTS.

Few heavenly bodies, and certainly none of the planets, present a more fascinating story than Neptune, the farthest known planet from the sun. The account of its discovery reads almost like a modern novel. Soon after the discovery of Uranus in 1781 the astronomers found, after closely studying its motions, that it was not walking the straight and narrow path in its course about the sun which law determined it should. After a close inspection of the data relating to the case by two young college graduates, Adams from Cambridge, England, and Leverrier a Frenchman, these young men decided that some body beyond the orbit of Uranus was responsible for Uranus' slight wanderings from its course. Though the deviation from its prescribed course was an amount so slight that it could be detected only by careful measurement, these young men after months of weary mathematical attack upon the problem independently came to a determination as to the size and position of the disturbing body. Leverrier sent his conclusions and data to Galle of Berlin, who had a fair telescope and a new star map of that part of the sky. In less than half an hour after Galle began his search, and within less than a degree from the exact point indicated he found this new object, in brightness between the eighth and ninth magnitude, and therefore far beyond the reach of the unaided eye. This was, of course, not only a fine tribute to the two young men and their work but is also a compelling testimony to the remarkable uniformity of law.

Many of the textbooks on astronomy speak of Neptune as a difficult

object for amateurs to locate in the sky, as indeed it is, without some help. In my early years as an amateur I desired very much to locate Neptune. I sought the aid of a professor of astronomy in a small college in Illinois. He assured me it was the next thing to an impossible task for an amateur and that he had never tried to locate it, although he had a fair telescope with circles. Yet it is not an impossibility by any means.

For several years Neptune has been out in a part of the sky at quite a distance from any bright stars, not very near a single one visible to the naked eye. But this fall will present an opportunity the amateur cannot afford to miss. It will be relatively easy to locate and follow Neptune by following these directions and using the accompanying map. Indeed it may be kept in view many weeks after its location, if the amateur will give it close scrutiny for a few evenings until he has become famliar with it and familiarized himself with its bearings relative to adjacent stars.

From the *Nautical Almanac* for 1927 (p. 673), we learn that Neptune is in conjunction with the sun on August 20. At this time it is on the opposite side of the sun from the earth and so will be practically invisible for about a month before and after this date. About September 20 or October 1 the amateur might begin his search for Neptune.

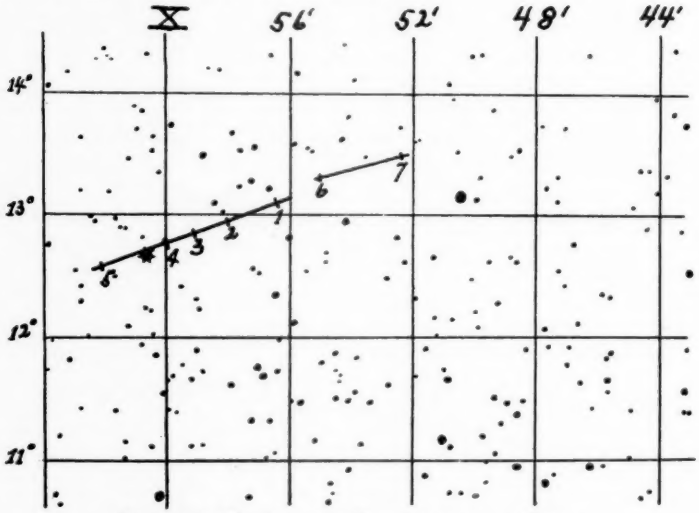
Neptune is in Leo, and while it may be the middle or last of October before much of this constellation may be visible in the early morning sky, still by October 1 the bright star Regulus, which is a first magnitude star, should show up in the east just before daylight.

The accompanying map was made from the well-known B.D. Charts (Bonner Durchmusterung). The course of Neptune is indicated on this copy of a small portion of one of the maps. On October 27 Neptune will pass Regulus only one and a half minutes of arc north of it. So any one with a small telescope or even a good pair of binoculars or field glasses should be able to find it on this day, or even somewhat before this date. With a mounted telescope and a finder, and especially if it has circles, Neptune can be picked up much sooner.

One may determine for a certainty that he has found Neptune by watching it for a day or two and noting its motion. Draw a little sketch, noting its position relative to the small stars about it. Its motion may become manifest in even less than twenty-four hours when its retrograde motion is especially large. At times it would require a few days if it was near the time when it seemingly "stands still" before starting its motion in the opposite direction. These times are manifest by following the data for Right Ascension as given in the *Nautical Almanac*.

Neptune may also be identified by its color and apparent disc. It is of a greenish hue but would seldom be noted for its color till one had scrutinized it closely for a few times. It is more difficult to distinguish it from the stars by any apparent diameter unless one is an experienced

observer. However, if one has a four or five-inch telescope—possibly even a three-inch one—he may be able to detect a definite disc or diameter, by putting on a very high magnifying power.



NEPTUNE'S MOTION WITH REFERENCE TO THE STARS.

The accompanying map is as constructed in 1855. In order to locate Neptune on this map it was necessary to make a correction for Precession. This correction for this particular location amounts to $3^m\ 53^s$ in Right Ascension, and 21′ in Declination. The correction for R.A. has to be subtracted and that for Dec. added to the *Nautical Almanac* figures. The figures at the left of the map are degrees in Dec.—thus 11°, 12°, 13°, and 14°. At the top of the map we have the reading for R.A.—thus, starting at the right, 9 hours and 44 minutes, etc., up to ten hours and four minutes. Regulus is the brightest star on the map. The smallest dots represent stars of the eighth, ninth, and tenth magnitudes.

Positions 1, 2, 3, 4, and 5 represent positions of Neptune on September 16, October 2, October 10, October 22, and November 23. At this last location Neptune remains in nearly the same place until December 13. Then it begins a retrograde motion and closely retraces its course until we find it in position 6, on March 1, 1928. By May 9, 1928, it has receded to R.A. $9^h\ 51^m$ on this map and then advances to a position north of Regulus by August 17, 1928, but by this time Neptune is close to the sun and so not visible.

An interesting condition is presented on October 27, 1927. A very near approach to an occultation or of a transit of Neptune in front of

Regulus occurs. To show how close this is we give here the R.A. and Dec. of Regulus and of Neptune on this day. These figures are taken directly from the *Nautical Almanac* and are not corrected to fit the B.D. map.

	October 27, 1927. R.A.	Dec.
Regulus	$10^h\ 4^m\ 30^s.097$	$+12°\ 19'\ 24''.35$
Neptune	10 4 32.156	12 20 48.57

At some hour during the day, which can be easily determined by interpolation, Neptune and Regulus will have the same R.A. However, they will still be separated by the slight difference in Dec.,—namely $1'\ 24''.22$. But this is indeed very close and will be well worth watching. A finer point connected with this phenomenon will be to observe if this distance between Regulus and Neptune will be any less at various stations on the earth, due to parallax. This close approach to Regulus is in itself a fascinating study for one possessed of the true scientific spirit and is a phenomenon that may never be repeated. By October 27 Neptune and Regulus should arise about four hours before the sun. This places them well up in the sky and so makes a fine observation possible.

On Neptune's return trip past Regulus it will be close again on January 9, 1928, but not as close as on October 27, 1927, as is revealed by the following positions taken again from the *Nautical Almanac* for 1928:

	January 9, 1928. R.A.	Dec.
Regulus	$10^h\ 4^m\ 32^s.445$	$+12°\ 19'\ 11''.57$
Neptune	10 4 30.94	12 23 2

Thus Neptune will be about four minutes of arc from Regulus. But even this will be well worth watching.

When it passes Regulus again on August 19 it will be still farther distant in Dec.,—namely over seven minutes of arc. But as stated before, Neptune will then be too close to the sun to be visible.

This study surely presents some interesting details that ought to appeal to the expert scientist and amateur alike.

Ravenna, Nebraska.

THE TILDEN METEOR, AN ILLINOIS DAYLIGHT FALL.

By C. C. WYLIE.

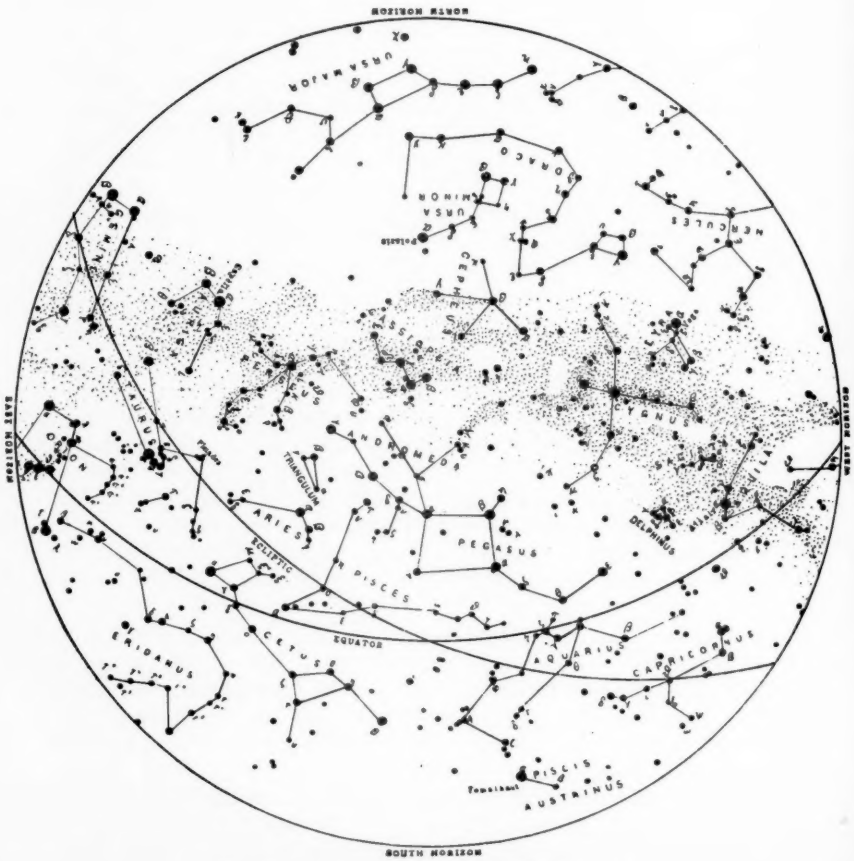
On the afternoon of July 13, 1927, at about 1:00 P.M., there fell in the vicinity of Tilden, Illinois, a stony meteor, hereafter referred to as the Tilden meteor. The meteor was seen as a ball of fire, "a piece falling off the sun," at a distance of more than a hundred miles, and burst

with house-shaking detonations. Four stones have been recovered, three of which weigh respectively 110, 46, and nine pounds. The fourth is a small piece weighing less than a pound.

From a preliminary study of the literature at hand, this appears to be the first fall reported from Illinois, and the 110-pound stone ranks among the largest seen to fall and preserved reasonably intact. Plaster casts will be made of the larger stones.

A full report will be published later, with photographs of the stones and of the holes made in striking.

UNIVERSITY OF IOWA, 1927 SEPTEMBER 21.



THE CONSTELLATION AT 9:00 P. M. NOVEMBER 1.

PLANET NOTES FOR NOVEMBER.

By CLIFFORD E. SMITH.

The *Sun* during November will be moving southeast from the western edge of Libra to the north central part of Scorpio, about five degrees north of the bright star Antares (α Scorpii). The positions of the sun for November 1 and November 30, are respectively, R.A. $14^h\ 21^m$, Decl. $-14°\ 2'$, and R.A. $16^h\ 20^m$, Decl. $-21°\ 27'$.

The phases of the *Moon* will occur as follows:

First Quarter	Nov. 2 at	9 A.M.	C.S.T.
Full Moon	9 "	1 A.M.	"
Last Quarter	15 "	11 P.M.	"
New Moon	24 "	4 A.M.	"

The moon will be at perigee (nearest the earth) on November 8, and at apogee (farthest from the earth) on November 21.

Mercury will be in the central part of Libra. The first nineteen days of the month it will have an apparent motion westward; thereafter its apparent motion will be eastward again. Early in the month Mercury will be invisible since inferior conjunction will occur on November 10. On November 27, however, it will be at greatest elongation west, and will rise about an hour and twenty minutes before the sun. On November 10 there will be a transit of Mercury across the sun which will be invisible in North America. Mercury will be in conjunction with Mars November 13.

Venus will be a morning star in Virgo, rising each morning about three hours before the sun. It will be at greatest elongation west on November 21.

Mars will be moving eastward in Libra just west of the sun. At the end of the month it will rise about an hour before the sun.

Jupiter will be a brilliant evening star in the western edge of Pisces. At sunset it will be about two hours east of the meridian during the middle of the month.

Saturn will be near the sun on the east. Conjunction will occur early in December.

Uranus will be in Pisces about five degrees east of Jupiter.

Neptune will be in Leo near Regulus. It will be in quadrature west of the sun on November 22. At this time it will rise about midnight.

Phenomena of Jupiter's Satellites.

VISIBLE AT WASHINGTON.

[From the *American Ephemeris.*]

CENTRAL STANDARD TIME, MIDNIGHT = 0^h

1927	h	m			1927	h	m		
Nov. 0	20	16	I	Tri. I.	Nov. 0	22	30	I	Tr. E.
	21	12	I	Sh. I.		23	25	I	Sh. E.

PHENOMENA OF JUPITER'S SATELLITES—Continued.

1927	h	m			1927	h	m		
Nov. 1	17	36	I	Oc. D.	Nov. 15	21	14	I	Oc. D.
	20	47.0	I	Ec. R.	16	18	22	I	Tr. I.
	22	42	III	Tr. I.		19	32	I	Sh. I.
2	16	57	I	Tr. E.		20	35	I	Tr. E.
	17	54	I	Sh. E.		21	45	I	Sh. E.
2	23	50	II	Tr. I.	17	19	6.8	I	Ec. R.
4	17	46.5	IV	Ec. D.	18	22	46	II	Oc. D.
	17	56	II	Oc. D.	19	19	51	III	Oc. D.
	19	9.5	IV	Ec. R.		22	45	III	Oc. R.
	22	32.2	II	Ec. R.	20	17	54	II	Tr. I.
5	16	44.2	III	Ec. D.		20	22	II	Sh. I.
	19	30.6	III	Ec. R.		20	31	II	Tr. E.
6	17	41	II	Sh. E.		22	54	II	Sh. E.
7	0	57	I	Oc. D.	21	0	7	IV	Oc. D.
	22	5	I	Tr. I.	22	17	5.3	II	Ec. R.
	23	7	I	Sh. I.		23	5	I	Oc. D.
8	0	18	I	Tr. E.	23	17	25	III	Sh. E.
	19	24	I	Oc. D.		20	13	I	Tr. I.
	22	42.5	I	Ec. R.		21	28	I	Sh. I.
9	16	32	I	Tr. I.		22	27	I	Tr. E.
	17	36	I	Sh. I.		23	40	I	Sh. E.
	18	45	I	Tr. E.	24	17	33	I	Oc. D.
	19	49	I	Sh. E.		21	2.3	I	Ec. R.
10	17	11.4	I	Ec. R.	25	16	55	I	Tr. E.
11	20	19	II	Oc. D.		18	9	I	Sh. E.
12	17	33	IV	Tr. I.	26	23	37	III	Oc. D.
	19	3	III	Oc. R.	27	20	24	II	Tr. I.
	19	32	IV	Tr. E.		22	59	II	Sh. I.
	20	46.4	III	Ec. D.		23	1	II	Tr. E.
	23	31.7	III	Ec. R.	29	17	9	II	Oc. R.
13	17	44	II	Sh. I.		17	9.0	II	Ec. D.
	18	3	II	Tr. E.		19	43.0	II	Ec. R.
13	20	18	II	Sh. E.	30	16	18	III	Tr. E.
14	23	54	I	Tr. I.					

NOTES—I. denotes ingress; E., egress; D., disappearance; R., reappearance; Ec., eclipse; Oc., occultation; Tr., transit of the satellite; Sh., transit of the shadow.

Occultations Visible at Washington.

[From the *American Ephemeris.*]

Date 1927		Star's Name	Magnitude	IMMERSION. Washington C.T.	IMMERSION. Angle from N	EMERSION. Washington C.T.	EMERSION. Angle from N	Duration
				h m	°	h m	°	h m
Nov. 5	290	B. Aquarii	6.3	0 18	25	1 7	276	0 50
5	30	Piscium	4.7	19 14	24	20 45	268	1 4
5	33	Piscium	4.7	21 36	74	22 45	214	1 9
7	26	Ceti	6.0	0 7	50	1 15	244	1 8
7	33	Ceti	6.1	3 56	19	4 32	293	0 36
12	5	Geminorum	5.9	3 48	67	5 2	290	1 14
12	ω	Geminorum	5.2	21 54	114	22 45	231	0 51
14	35	B. Cancri	6.4	3 52	102	5 19	283	1 27
19	c	Virginis	5.1	4 22	60	5 0	0	0 38
21	88	Virginis	6.5	5 17	71	6 2	353	0 45
30	154	B. Capricorni	6.1	16 38	6	17 21	304	0 44

VARIABLE STARS.

Minima of Variable Stars of Short Period.

[Calculated by members of the classes in Astronomy at Carleton College.]

Given to the nearest hour in Greenwich civil time; to obtain Eastern Standard time subtract 5^h; Central Standard time 6^h, etc.

Star	R.A 1900	Decl. 1900	Magnitude	Approx. Period	Greenwich civil times of Minima in 1927 November							
	h m	° ′		d h	d h	d h	d h	d h	d h	d h	d h	d h
SY Androm.	0 08.0	+43 09	9.5—13.0	34 21.8			12 14					
RT Sculptor.	31.5	—26 13	9.6—10.5	0 12.3	8 13		16 6		23 22			
U Cephei	0 53.4	+81 20	7.0— 9.0	2 11.8	1 11		8 22		16 10		23 21	
Z Persei	2 33.7	+41 46	9.4—12	3 01.4	6 17		12 20		18 22		25 1	
TW Cassiop.	37.6	+65 19	8.2— 9.0	1 10.3	8 6		16 19				25 9	
RY Persei	39.0	+47 43	8.0—10.3	6 20.7	3 12		10 9		24 3		30 23	
RZ Cassiop.	39.9	+69 13	6.9— 8.1	1 04.7	5 19		12 23		20 3		27 8	
TX Cassiop.	44.4	+62 22	9.4—10.1	2 22.2	8 22		17 17				26 12	
ST Persei	53.7	+38 47	8.5—10.5	2 15.6	8 19		16 18		24 17			
RX Cassiop.	2 58.8	+67 11	8.6— 9.1	32 07.6							27 16	
Algol	3 01.7	+40 34	2.3— 3.5	2 20.8	4 10		13 0		21 15		30 5	
RT Persei	16.7	+46 12	9.5—11.5	0 20.4	2 13		9 8		22 22		29 17	
λ Tauri	55.1	+12 12	3.3— 4.2	3 22.9	6 12		14 10		22 7		30 5	
RW Tauri	3 57.8	+27 51	7.1— [11	2 18.5	7 18		16 1		24 8			
RV Persei	4 04.2	+33 59	9.5—11.0	1 23.4	4 22		12 20		20 17		28 15	
RW Persei	13.3	+42 04	8.8—11.0	13 04.8	7 13				20 18			
SZ Tauri	31.4	+18 20	7.2— 7.7	3 03.6	3 7		9 14		22 4		29 11	
RS Cephei	4 48.6	+80 06	9.5—12.0	12 10.1	4 9		16 19				29 6	
TT Aurigae	5 02.8	+39 27	7.8— 8.7	0 16.0	1 5		7 21		21 5		27 21	
RY Aurigae	11.5	+38 13	10.7—11.7	2 17.5	4 4		12 8		20 12		28 16	
RZ Aurigae	42.9	+31 40	10.6—13.3	3 00.3	6 1		12 1		24 2		30 3	
SV Tauri	45.8	+28 05	9.4—11.0	2 04.0			8 4		16 21		25 13	
Z Orionis	50.2	+13 40	9.7—10.7	5 04.9	6 0				16 10		26 20	
SV Gemin.	54.6	+24 28	9.8— [11	4 00.2	7 19		15 19		23 20			
RW Gemin.	5 55.4	+23 08	9.5—11.0	2 20.8	1 3		12 14		18 7		29 18	
U Columbæ	6 11.2	—33 03	9.2—10.0	2 19.2	3 8		8 22		20 3		25 17	
SX Gemin.	22.0	+20 37	10.8—11.5	1 08.8	3 9		11 14		19 19		28 0	
RW Monoc.	29.3	+ 8 54	9.0—10.8	1 21.7	6 5		13 20		21 11		29 2	
RX Gemin.	43.6	+33 21	8.8— 9.6	12 05.0			13 1				25 6	
RU Monoc.	6 49.4	— 7 28	9.8—10.5	0 21.5	1 15		8 19		23 3		30 7	
R Can. Maj.	7 14.9	—16 12	5.8— 6.4	1 03.3	6 8		13 4		19 23		26 19	
RY Gemin.	21.7	+15 52	8.9— [10	9 07.2	1 12		10 20		20 3		29 10	
Y Camelop.	27.6	+76 17	9.5—12	3 07.3	7 8		13 22		20 13		27 4	
TX Gemin.	30.3	+17 08	10.0—11.9	2 19.2	6 11		14 20		23 6			
RR Puppis	43.5	—41 08	9.4—10.7	6 10.3	2 23		9 9		22 6		28 16	
V Puppis	7 55.4	—48 58	4.1— 4.8	1 10.9	3 12		10 18		18 1		25 8	
X Carinæ	8 29.1	—58 53	7.9— 8.7	0 13.0	2 14		10 17		18 19		26 22	
S Cancri	8 38.2	+19 24	8.2—10	9 11.6	1 19		11 5		20 19		30 6	
RX Hydræ	9 00.8	— 7 52	9.1—10.5	2 06.8	1 13		8 9		22 2		28 23	
S Velorum	29.4	—44 46	7.8— 9.3	5 22.4	6 19		12 18		24 15		30 13	
Y Leonis	9 31.1	+26 41	9.3—11.2	1 16.5	5 12		12 6		19 0		25 17	
RR Velorum	10 17.8	—41 36	10.0—10.9	1 20.5	1 20		9 6		16 17		24 2	
SS Carinæ	10 54.2	—61 23	12.2—12.8	3 07.2	7 4		13 19		20 9		27 0	
ST Urs. Maj.	11 22.4	+45 44	6.7— 7.2	8 19.2	5 8		14 3		22 22			
RW Urs. Maj.	35.4	+52 34	10.3—11.4	7 07.9	2 18		10 2		17 10		24 17	
Z Draconis	11 39.8	+72 49	9.9—13.6	1 08.6	4 19		11 14		18 9		25 4	
RZ Centauri	12 55.6	—64 05	8.5— 8.9	1 21.0	6 21		14 9		21 21		29 9	
RS Can. Ven.	13 06.3	+36 28	7.5—12.5	4 19.1	6 23		16 14				26 4	

Minima of Variable Stars of Short Period—Continued.

Star	R.A. 1900	Decl. 1900	Magnitude	Approx. Period	Greenwich civil times of Minima in 1927 November							
	h m	° ′		d h	d h	d h	d h	d h	d h	d h	d h	d h
SS Centauri	13 07.2	−63 37	8.8—10.4	2 11.5	5 9	12 20	20 6	27 17				
SX Hydræ	39.0	−26 23	8.6—12.7	2 21.5	4 16	14 8	22 1	30 17				
δ Libræ	14 55.6	− 8 07	4.8— 6.2	2 07.9	6 20	13 19	20 19	27 18				
U Coronæ	15 14.1	+32 01	7.6— 8.7	3 10.9	7 15	12 12	2110	28 8				
TW Draconis	15 32.4	+64 14	7.3— 8.9	2 19.4	5 18	14 5	22 14					
SS Libræ	15 43.4	−15 14	9.3—11.5	0 18.4	6 6	13 10	20 15	27 19				
SW Ophiuchi	16 11.1	− 6 44	9.2—10.0	2 10.7	1 5	8 13	23 5	30 14				
SX Ophiuchi	12.6	− 6 25	10.5—11.2	2 01.5	3 2	11 8	19 14	27 21				
R Aræ	31.1	−56 48	6.8— 7.9	4 10.2	9 17	18 13		27 9				
TT Herculis	16 49.9	+17 00	8.9— 9.3	20 18.1	4 14		25 8					
TU Herculis	17 09.8	+30 50	9.5—12	2 06.4	3 21	10 17	17 12	24 9				
U Ophiuchi	11.5	+ 1 19	6.0— 6.7	1 16.2	6 4	14 13	22 22					
u Herculis	13.6	+33 12	4.6— 5.4	2 01.2	3 2	9 6	21 13	27 17				
TX Herculis	15.4	+42 00	8.3— 9.0	2 01.4	3 11	9 15	22 0	28 4				
RV Ophiuchi	29.8	+ 7 19	9. —12	3 16.5	8 0	14 22	22 7	29 16				
SZ Herculis	36.0	+33 01	9.5—10.3	0 19.6	3 19	11 23	20 4	28 8				
TX Scorpii	48.6	−34 13	7.5— 8.2	0 22.6	5 1	12 14	20 2	27 16				
UX Herculis	49.7	+16 57	8.8—10.5	1 13.2	4 13	12 6	21 0	27 18				
Z Herculis	53.6	+15 09	7.1— 7.9	3 23.8	4 0	12 0	19 23	27 23				
WX Sagittarii	53.6	−17 24	9.2—10.8	2 03.1	9 2	17 14		26 2				
WY Sagittarii	17 54.9	−23 01	9.5—10.6	4 16.0	4 16	14 0	18 16	28 0				
SX Draconis	18 03.0	+58 23	9.3—10.5	5 04.1	1 21	12 5	17 10	27 18				
RS Sagittarii	11.0	−34 08	5.9— 6.3	2 10.0	3 21	11 3	18 9	25 15				
V Serpentis	11.1	−15 34	9.5—11.1	3 10.9	6 14	13 12	20 9	27 7				
RZ Scuti	21.1	− 9 15	7.4— 8.3	15 03.2	8 8		23 11					
RZ Draconis	21.8	+58 50	9.5—10.2	0 13.2	4 10	11 13	18 17	25 21				
RX Herculis	26.0	+12 32	7.0— 7.6	0 21.3	1 21	9 0	23 6	30 8				
SX Sagittarii	39.7	−30 36	8.7— 9.8	2 01.8	8 15	16 13	24 20					
RR Draconis	40.8	+62 34	9.3—13	2 19.9	4 6	12 17	21 5	29 17				
RS Scuti	43.7	−10 21	9.3—10.3	0 15.9	7 0	12 16	19 7	25 23				
β Lyræ	46.4	+33 15	3.4— 4.1	12 21.8		9 12	22 10					
U Scuti	18 48.9	−12 44	9.1— 9.6	0 22.9	3 12	11 4	18 19	26 11				
RX Draconis	19 01.1	+58 35	9.3—10.2	1 21.4	5 13	13 3	20 17	28 6				
RV Lyræ	12.5	+32 15	11. —12.8	3 14.4	3 23	11 4	18 9	25 13				
RS Vulpec.	13.4	+22 16	6.9— 8.0	4 11.4	7 6	16 4		25 3				
U Sagittæ	14.4	+19 26	6.5— 9.0	3 09.1	1 21	8 15	22 4	28 22				
Z Vulpec.	17.5	+25 23	7.3— 8.5	2 10.9	6 11	13 20	21 4	28 13				
TT Lyræ	24.3	+41 30	9.4—11.6	5 05.8	2 0	12 12	17 18	28 6				
UZ Draconis	26.1	+68 44	9.0— 9.8	1 15.1	5 16	12 5	18 17	25 6				
SY Cygni	19 42.7	+32 28	10. —12	6 00.2	5 22	11 22	23 22	29 22				
WW Cygni	20 00.6	+41 18	9.3—13.4	3 07.6	1 12	8 3	21 9	28 1				
SW Cygni	03.8	+46 01	9. —11.7	4 13.8	1 4	10 7	19 11	28 14				
VW Cygni	11.4	+34 12	9.8—11.8	8 10.3	7 13	15 23	24 9					
RW Capric.	12.2	−17 59	8.8—10.6	3 09.4	1 17	8 12	22 1	28 20				
UW Cygni	19.6	+42 55	10.5—13	3 10.8	6 2	12 23	19 21	26 19				
V Vulpec.	32.3	+26 15	8.2— 9.8	37 19.0								
W Delphini	33.1	+17 56	9.4—12.1	4 19.4	1 3	10 18	20 8	29 23				
RR Delphini	38.9	+13 35	10.5—11.8	4 14.4	3 23	13 4	22 9					
Y Cygni	48.1	+34 17	7.1— 7.9	2 23.9	8 13	17 13	26 13					
WZ Cygni	49.3	+38 27	9.9—10.8	0 14.0	5 7	12 21	20 11	28 2				
RR Vulpec.	20 50.5	+27 32	9.6—11.0	5 01.2	2 1	12 3	22 5					
RY Aquarii	21 14.8	−11 14	8.8—10.4	1 23.2	8 17	16 14	24 11					
UZ Cygni	55.2	+43 52	8.9—11.6	31 07.3		13 10						
RT Lacertæ	21 57.4	+43 24	9.1—10.5	5 01.7	2 11	12 14	17 16	27 19				
RW Lacertæ	22 40.6	+49 08	10.2—11.2	5 04.4	5 20	11 1	21 10	26 14				
VW Pegasi	51.7	+32 42	10.0—10.6	5 06.4	6 3	11 10	21 23	27 5				
Y Piscium	23 29.3	+ 7 22	9.0—12.0	3 18.4	5 22	13 10	20 23	28 12				
TW Androm.	23 58.2	+32 17	8.6—11.5	4 02.9	4 2	12 7	20 13	28 19				

Maxima of Variable Stars of Short Period.

[Calculated by members of the classes in Astronomy at Carleton College.]

Given to the nearest hour in Greenwich civil time; to obtain Eastern Standard time subtract 5^h; Central Standard time 6^h, etc.

Star	R.A. 1900	Decl. 1900	Magnitude	Approx. Period	Greenwich civil times of maxima in 1927 November					
	h m	° ′		d h	d h	d h	d h	d h	d h	d h
SX Cassiop.	0 05.5	+54 20	8.6— 9.2	36 13.7	5 0					
SY Cassiop.	0 09.8	+57 52	9.3— 9.9	4 01.7	6 1	14 4	22 7	30 11		
RR Ceti	1 27.0	+ 0 50	8.3— 9.0	0 13.3	4 0	11 18	19 11	27 5		
RW Cassiop.	1 30.7	+57 15	8.9—11.0	14 19.2	3 5		18 1			
V Arietis	2 09.6	+11 46	8.3— 9.0	0 23.8	4 4	12 3	20 1	28 0		
SU Cassiop.	2 43.0	+68 28	6.5— 7.0	1 22.8	2 0	9 19	17 14	25 9		
RW Camelop.	3 46.2	+58 21	8.2— 9.4	16 00.0	4 14		21 0			
SX Persei	4 10.2	+41 27	10.4—11.2	4 07.0	5 13	14 3	22 17			
SV Persei	42.8	+42 07	8.8— 9.6	11 03.1	2 6	13 9	24 12			
RX Aurigæ	4 54.5	+39 49	7.2— 8.1	11 15.0	2 5	13 19	25 10			
SX Aurigæ	5 04.6	+42 02	8.0— 8.7	1 12.8	6 12	14 5	21 20	29 12		
SY Aurigæ	05.5	+42 41	8.4— 9.5	10 03.3	8 14		18 17	28 21		
Y Aurigæ	21.5	+42 21	8.6— 9.6	3 20.6	8 2	15 19	23 12			
RZ Gemin.	5 56.6	+22 15	9.1—10.0	5 12.7	1 21	12 23	18 12	29 13		
RS Orionis	6 16.5	+14 44	8.2— 8.9	7 13.6	5 23	13 12	21 2	28 15		
T Monoc.	19.8	+ 7 08	5.7— 6.8	27 00.3	7 13					
RT Aurigæ	23.0	+30 33	5.1— 6.0	3 17.5	4 7	11 18	19 5	26 16		
W Gemin.	29.2	+15 24	6.7— 7.5	7 22.0	1 9	11 7	19 5	27 3		
ζ Gemin.	6 58.2	+20 43	3.7— 4.3	10 03.7	4 8	14 12	24 16			
RU Camelop.	7 10.9	+69 51	8.5— 9.8	22 06.5	7 7			29 14		
RR Gemin.	7 15.2	+31 04	10.0—11.5	0 09.5	5 15	13 14	21 12	29 11		
V Carinæ	8 26.7	—59 47	7.4— 8.1	6 16.7	5 11	12 3	18 20	25 12		
T Velorum	8 34.4	—47 01	7.6— 8.5	4 15.3	2 18	12 1	21 8	30 15		
V Velorum	9 19.2	—55 32	7.5— 8.2	4 08.9	3 21	12 14	21 8	30 2		
Z Leonis	9 46.4	+27 22	7.9— 9.6	56 08.7						
RR Leonis	10 02.1	+24 29	9.1—10.1	0 10.9	1 20	8 15	22 5	29 0		
SU Draconis	11 32.2	+67 53	8.9— 9.6	0 15.8	5 9	12 0	18 15	25 5		
S Muscæ	12 07.4	—69 36	6.4— 7.3	9 15.8	3 20	13 12	23 3			
SW Draconis	12.8	+70 04	8.8— 9.6	0 13.7	8 0	15 23	23 23			
T Crucis	15.9	—61 44	6.8— 7.6	6 17.6	2 17	9 11	22 22	29 15		
R Crucis	18.1	—61 04	6.8— 7.9	5 19.8	1 10	13 2	18 22	30 13		
S Crucis	12 48.4	—57 53	6.5— 7.6	4 16.6	5 10	14 19	1911	28 21		
W Virginis	13 20.9	— 2 52	8.7—10.4	17 06.5		10 18		28 1		
SS Hydræ	25.0	—23 08	7.4— 8.1	8 04.8		8 22	17 3	25 8		
RV Urs. Maj.	13 29.4	+54 31	9.2— 9.9	0 11.2	6 17	13 18	20 18	27 19		
ST Virginis	14 22.5	— 0 27	10.3—11.4	0 09.9	4 14	12 0	19 10	26 19		
V Centauri	25.4	—56 27	6.4— 7.8	5 11.9	4 19	10 7	21 7	26 19		
RS Bootis	29.3	+32 11	8.9—10.0	0 09.1	2 8	9 21	17 11	25 0		
R Trian.Austr.	15 10.8	—66 08	6.7— 7.4	3 09.3	5 0	11 18	18 13	25 8		
S Trian.Austr.	15 52.2	—63 29	6.4— 7.4	6 07.8	6 11	12 19	19 3	25 10		
S Normæ	16 10.6	—57 39	6.6— 7.6	9 18.1	7 1		16 19	26 13		
RW Draconis	33.7	+58 03	9.6—10.3	0 10.6		9 15	18 12	27 8		
RV Scorpii	16 51.8	—33 27	6.7— 7.4	6 01.5	1 19	7 20	20 0	26 1		
X Sagittarii	17 41.3	—27 48	4.4— 5.0	7 00.3	2 14	9 15	23 15	30 15		
Y Ophiuchi	47.3	— 6 07	6.1— 6.5	17 02.9		14 2		31 5		
W Sagittarii	17 58.6	—29 35	4.3— 5.1	7 14.3	8 6	15 21	23 11			
Y Sagittarii	18 15.5	—18 54	5.4— 6.2	5 18.6	1 11	13 0	18 18	30 7		
U Sagittarii	26.0	—19 12	6.5— 7.3	6 17.9	2 17	9 11	22 23	29 16		
Y Scuti	32.6	— 8 27	8.7— 9.2	10 08.3		10 12	20 20			
RZ Lyræ	39.9	+32 42	9.9—11.2	0 12.3	6 21	14 14	22 6	29 22		
RT Scuti	44.1	—10 30	9.1— 9.7	0 11.9	1 12	8 22	16 8	23 18		
κ Pavonis	18 46.6	—67 22	3.8— 5.2	9 02.2		9 9	18 12	27 14		

Maxima of Variable Stars of Short Period—Continued.

Star	R.A. 1900	Decl. 1900	Magnitude	Approx. Period	Greenwich civil times of maxima in 1927 November					
	h m	° ′		d h	d h	d h	d h	d h	d h	d h
U Aquilæ	19 24.0	— 7 15	6.2— 6.9	7 00.6	2 20	9 21	23 22	30 23		
XZ Cygni	19 30.4	+56 10	8.6— 9.3	0 11.2	7 3	14 3	21 3	28 2		
U Vulpec.	32.2	+20 07	6.5— 7.6	7 23.5	4 6	12 5	20 5	28 4		
SU Cygni	40.8	+29 01	6.2— 7.0	3 20.3	1 10	9 2	16 9	24 11		
η Aquilæ	47.4	+ 0 45	3.7— 4.5	7 04.2	5 10	12 14	19 18	26 23		
S Sagittæ	51.5	+16 22	5.6— 6.4	8 09.2	8 18		17 4	25 13		
X Vulpec.	19 53.3	+26 17	9.5—10.5	6 07.7	1 9	7 17	20 8	26 16		
X Cygni	20 39.5	+35 14	6.0— 7.0	16 09.3		15 6				
T Vulpec.	47.2	+27 52	5.5— 6.1	4 10.5	7 1	15 22	24 19			
UY Cygni	52.3	+30 03	9.6—10.4	0 13.5	5 17	13 0	20 7	27 14		
RV Capric.	55.9	—15 37	9.2—10.1	0 10.7	6 14	13 18	20 22	28 2		
TX Cygni	20 56.4	+42 12	8.5— 9.7	14 17.4	4 18		19 11			
VY Cygni	21 00.4	+39 34	8.8— 9.5	7 20.6	4 13	12 10	20 6	28 3		
SW Aquarii	10.2	— 0 20	9.9—10.8	0 11.0	1 22	8 19	22 14	29 11		
VZ Cygni	21 47.7	+42 40	8.2— 9.2	4 20.7	9 20		19 13	29 7		
Y Lacertæ	22 05.2	+50 33	9.1— 9.6	4 07.8		9 9	18 0	26 16		
δ Cephei	25.5	+57 54	3.7— 4.6	5 08.8	2 21	13 15	18 23	29 17		
Z Lacertæ	36.9	+56 18	8.2— 9.0	10 21.1		10 16	21 13			
RR Lacertæ	37.5	+55 55	8.5— 9.2	6 10.1	1 9	7 19	20 14	27 0		
V Lacertæ	44.5	+55 48	8.5— 9.5	4 23.6		8 19	18 18	28 17		
X Lacertæ	22 45.0	+55 54	8.2— 8.6	5 10.7	5 1	10 12	21 9	26 20		
SW Cassiop.	23 03.7	+58 11	9.2— 9.7	5 10.6	1 8	12 5	17 16	28 13		
RS Cassiop.	32.6	+61 52	9.0—11.0	6 07.1	6 15	12 22	19 5	25 12		
RY Cassiop.	47.2	+58 11	9.3—11.8	12 03.4		9 17	21 20			
V Cephei	23 51.7	+82 38	6.0— 7.0	0 23.9	5 11	12 11	19 11	26 10		

Monthly Report of the American Association of Variable Star Observers, for the Months of July and August, 1927.

Once again we are confronted with the loss by death of one of our officers, the late president, Dr. Charles C. Godfrey of Stratford, Conn. Dr. Godfrey passed away on August 31, after spending the entire summer in the Bridgeport hospital. Up until a week before his death, he had been progressing most favorably and had planned out all details for the coming meeting of the Association on October 22. Past presidents Pickering, Yalden, and Campbell officially represented the Association at the funeral services.

Dr. Godfrey had been our presiding officer since last October, having served as Vice President the previous year. Those who attended the Spring meeting at Yale last May will recall with what dignity and pleasure he presided at that meeting and how well he carried out the program.

His loss will be keenly felt, especially in the Councils of the Association, for his wide scientific knowledge and experience had made him a valuable member. He possessed a well equipped observatory at his home, which included, besides several large reflectors of his own handiwork, an extensive library. His astronomical outfit and library have been bequeathed to the Association.

It is a pleasure to welcome back to the ranks of active observers Mrs. D. H. Leavens, formerly of College of Yale, in China, now of Norwich, Conn., and Mr. F. J. Carr of Swanton, Vt. Severa. new contributors ore listed herewith: three from California, Messrs. J. C. Howe of Oakland, Richard Williams of San

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1927.

June 0 = J.D. 2425032; July 0 = J.D. 2425062; August 0 = J.D. 2425093.

J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
V Scl	T Phe	Y And	RR Cep	T Cam	R Cae
000339	*002546*	013338	022980	043065	*043738*
059[13.3 Bl	059 11.4 Bl	093 13.8 Pt	064 14.0 L	069 8.1 L	004 10.2 Ht
S Scl	W Scl	X Cas	083 14.0 L	083 7.8 L	006 9.9 Bl
001032	*002833*	014958	R Tri	092 8.2 Wk	006 9.5 Sm
059 12.1 Bl	059 13.0 Bl	008 12.6 Bn	023133	093 7.4 Pt	013 8.9 Bl
092 10.2 Ht	RW And	035 11.5 Bn	065 12.0 Pt	R Ret	021 8.5 Bl
X And	004132	061 12.1 Pt	093 11.1 Pt	*043263*	029 8.3 Bl
001046	061 10.5 Pt	093 12.4 Pt	W Per	972 6.9 En	035 8.1 Bl
051 9.3 Bf	093 12.1 Pt	U Per	024356	978 7.1 En	043 8 0 Bl
108 9.5 Cl	V And	015254	065 10.4 Pt	993 7.8 En	059 7.8 Bl
T And	004435	061 8.4 Pt	093 9.7 Pt	999 8.2 En	R Pic
001726	051 12.8 Bf	093 8.5 Pt	099 10.6 Ca	004 7.7 Ht	*044349*
061 12.6 Pt	X Scl	097 8.2 Ca	R Hor	004 8.3 En	006 8.6 Bl
065[10.7 Ch	*004435*	S Ari	*025050*	006 8.0 Bl	013 8.9 Bl
093 13.8 Pt	059[13.1 Bl	015912	972 9.3 En	007 7.8 Sm	021 9.1 Bl
T Cas	RR And	061 13.0 Pt	978 9.5 En	013 8.0 Bl	029 9.2 Bl
001755	004533	R Ari	006 10.7 Bl	018 8.7 Ht	035 9.4 Bl
062 8.6 Ch	051 9.1 Bf	021024	007 10.5 Sm	021 8.6 Bl	043 9.2 Bl
064 8.4 Wk	RV Cas	056 7.8 L	013 11.2 Bl	025 8.7 Ht	051 9.3 Bl
077 8.5 L	004746a	061 7.9 Pt	025 11.1 Bl	025 9.1 Sm	058 9.2 Bl
077 8.5 An	061 10.2 Pt	087 9.3 L	035 11.9 Bl	029 9.3 Bl	V Tau
086 8.6 Jo	093 10.9 Pt	093 10.0 Pt	059 12.5 Bl	031 9.7 Sm	044617
091 9.2 L	— Cas	096 9.9 Ca	092 13.0 Ht	035 9.8 Bl	093 8.8 Pt
092 10.3 Wk	004746b	W And	T Hor	035 9.7 Ht	T Lep
096 10.0 Ca	061 10.6 Pt	021143a	*025751*	038 10.1 Sm	*050022*
096 9.5 Jo	093 10.7 Pt	061 11.3 Pt	006 7.8 Bl	041 10.5 Ht	951 10.0 Lo
110 10.2 Jo	W Cas	093 12.3 Pt	007 8.0 Sm	043 9.9 Bl	962 10.6 Lo
R And	004958	T Per	013 7.5 Bl	051 10.5 Bl	005 11.1 Bl
001838	061 9.0 Pt	021258	025 8.1 Bl	058 11.2 Bl	013 11.1 Bl
060 9.5 Jo	093 9.0 Pt	065 8.4 Pt	035 8.0 Bl	092 12.4 Ht	025 11.5 Bl
061 11.1 Pt	U Tuc	093 8.5 Pt	043 8.0 Bl	X Cam	S Pic
070 9.4 Jo	*005475*	096 8.5 Jo	059 9.8 Bl	043274	*050848*
093 8.6 Pt	029 13.7 Bl	Z Cep	X Cet	065 12.2 Pt	962[11.4 Lo
096 8.1 Jo	059 11.2 Bl	021281	*031401*	092 10.5 Wk	993 11.6 En
098 8.4 Rt	065 10.3 Sm	093 13.8 Pt	087 9.1 L	093 10.2 Pt	999 11.4 En
S Tuc	091 9.7 Sm	o Cet	087 9.1 Ca	R Dor	003 11.0 En
001862	X Cet	*021403*	093 9.7 Pt	*043562*	006 10.3 Bl
004 10.9 Bl	*010102*	065 8.8 Ch	096 9.6 Ca	972 5.4 En	006 11.0 Sm
013 9.8 Bl	061 11.0 Pt	087 7.8 L	Y Per	978 5.8 En	013 8.5 Bl
022 9.3 Bl	093 13.0 Pt	093 7.3 Pt	032043	993 6.0 En	021 8.3 En
029 9.0 Bl	U Scl	096 7.5 Ca	065 8.8 Pt	999 5.8 En	021 8.4 Bl
036 8.8 Bl	*010630*	112 5.6 Ca	093 9.0 Pt	004 5.5 Ht	025 8.1 Sm
044 8 8 Bl	059 10.6 Bl	S Per	R Per	004 5.8 En	029 8.0 Bl
059 9.6 Bl	S Cas	021558	032335	006 5.8 Bl	031 7.8 Sm
059 10.4 Sm	011272	065 9.8 Pt	096[12.3 Ca	007 5.8 Sm	035 8.2 Bl
062 9.0 Ch	061 12.6 Pt	093 9.4 Pt	R Tau	013 5.8 Bl	038 7.5 Sm
083 9.2 Gb	093 13.1 Pt	096 10.3 Jo	042209	018 5.8 Ht	043 7.6 Bl
S Cet	U Psc	R Cet	099[12.0 Ca	021 6.0 Bl	051 8.2 Bl
001900	011712	*022000*	W Tau	025 5 6 Ht	058 8.0 Bl
061 8.3 Pt	061 11.5 Pt	099[12.0 Ca	042215	025 5.8 Sm	R Aur
066 9.0 Lg	R Psc	RR Per	093 9.7 Pt	029 6.0 Bl	050953
087 9.5 L	012502	022150	S Tau	031 5.8 Sm	099 [9.7 Ca
093 10.1 Pt	051 12.1 Bf	065 9.6 Pt	042309	035 6.0 Bl	T Pic
096 10.1 Ca	RU And	093 9.6 Pt	093 10.4 Pt	035 5.8 Ht	*051247*
096 10.2 Lg	013238	R For	099 10.4 Ca	038 5.8 Sm	993 11.8 En
097 10.2 Lg	061 11.8 Pt	*022425*	T Cam	041 5.8 Ht	999 11.0 En
098 10.1 Lg	093 13.0 Pt	059 11.4 Bl	043065	043 6.2 Bl	003 10.8 En
099 10.3 Lg	Y And	U Cet	036 8.6 L	051 6.3 Bl	004 11.1 Bl
	013338	*022813*	053 8.7 L	058 6.2 Bl	004 11.4 Ht
	061 13.5 Pt	093 9.9 Pt	065 8.3 Pt	092 5.7 Ht	006 10.6 Sm

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1927.

J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
T Pic	RU Aur	R Oct	R Lyn	W Pup	R Cha
051247	053337	*055686*	065255	*074241*	*082476*
013 10.2 Bl	093o12.0 Pt	029 10.2 Bl	093 7.8 Pt	972 8.5 En	025 10.2 Ht
018 10.2 Ht	U Aur	035 10.4 Bl	R Gem	976 8.2 En	028 10.6 Sm
021 9.2 En	053531	035 10.3 Sm	070122a	981 8.7 En	029 9.8 Bl
021 9.5 Bl	093 13.0 Pt	043 10.4 Bl	021[11.3 Ch	984 8 9.En	030 10.2 Ht
025 9.7 Ht	SU Tau	051 10.7 Bl	R Vol	993 9.6 En	034 10.3 En
025 9.3 En	054319	051 11.0 Sm	*070772*	998 10.1 En	035 10.4 Lo
025 9.5 Sm	984 10.0 An	058 11.0 Bl	972 11.6 En	003 10.4 En	035 10.1 Bl
029 9.3 Bl	087 9.7 L	061 11.4 Sm	976 11.3 En	004 10.6 Ht	035 10.6 Sm
031 9.5 Sm	093 9.7 Pt	093 11.6 Sm	993 10.8 En	007 10.7 Bl	043 10.0 Bl
035 9.7 Bl	S Col	X Aur	999 10.4 En	008 10.1 Sm	051 10.2 Bl
035 9.5 Ht	*054331*	060450	003 10.4 En	013 11.3 Bl	051 10.5 Sm
038 9.7 Sm	951 10.6 Lo	022 10.5 Ch	004 9.9 Ht	014 11.2 En	051 10.6 En
043 9.6 Bl	962 11.0 Lo	093 8.8 Pt	008 9.6 Sm	018 11.9 Ht	055 10.8 En
051 9.9 Bl	972 11.2 En	— Aur	018 9.6 Ht	021 12.2 En	056 10.7 Lo
058 9.8 Bl	976 11.6 En	062047	021 10.2 En	021 11.9 Bl	058 10.6 Bl
T Col	993 11.8 En	040 9.8 Be	025 10.2 En	025 12.2 Ht	061 11.0 Sm
051533	999 12.2 En	050 10.1 Be	025 9.6 Ht	025 12.6 En	061 11.0 En
951 10.1 Lo	003 12.2 En	060 10.0 L	028 10.2 Sm	025 12.3 Sm	069 11.5 Sm
962 9.1 Lo	004 11.9 Ht	073 10.0 L	030 10.1 En	029 12.2 Bl	091 11.9 Sm
972 8.7 En	006 12.2 Sm	087 9.3 L	034 10.0 En	030 12.6 En	U Cnc
977 8.3 En	021 12.6 Ht	Nov. Pic	035 10.1 Lo	031 12.6 Sm	083019
981 8.2 En	021 12.5 Bl	*063462*	035 9.6 Sm	034 12.6 En	006[12.4 GC
993 8.1 En	025 12.6 Ht	976 6.3 En	035 9.6 Ht	035 12.2 Bl	016[13.3 GC
999 8.3 En	031 13.1 Sm	981 6.4 En	041 9.3 Ht	035 12.6 Ht	X UMa
003 7.9 En	R Col	984 6.5 En	048 9.9 Ht	036 12.4 Sm	083350
004 7.5 Ht	*054629*	993 6.5 En	051 9.6 Sm	043 11.4 Bl	056 11.0 Pt
006 7.2 Bl	951 10.4 Lo	003 6.5 En	051 10.0 En	048 10.8 Ht	S Hya
006 7.9 Sm	962 10.4 Lo	004 6.3 Ht	055 9.6 Ht	049 10.3 Sm	084803
013 7.7 Bl	976 11.1 En	007 6.5 Sm	061 9.6 Sm	051 10.0 Bl	021 8.5 Ch
014 7.6 En	993 11.8 En	014 6.6 En	073 9.6 Ht	051 10.4 En	035 8.9 Ch
018 7.5 Ht	999 12.0 En	018 6.5 Ht	090 9.9 Ht	055 9.6 Ht	T Hya
021 7.8 En	003 12.0 En	021 6.5 Ht	093 10.4 Sm	056 9.9 Sm	*085008*
021 7.6 Bl	004 12.7 Ht	025 6.6 Ht	S Vol	058 9.2 Bl	030[10.8 Ch
025 7.2 Ht	006 12.2 Bl	025 6.6 En	*073173*	062 9.4 Ht	T Cnc
025 8.1 En	006 11.7 Sm	025 6.3 Sm	951 10.0 Lo	064 9.4 Sm	085120
025 8.1 Sm	021 13.0 Ht	028 6.4 Sm	962 9.6 Lo	T Gem	021 9.8 Ch
029 7.7 Bl	021 12.7 Bl	030 6.6 En	976 9.5 En	074323	T Pyx
031 7.9 Sm	U Ori	031 6.3 Sm	993 10.0 En	021[11.5 Ch	*090031*
035 7.9 Bl	054920a	034 6.6 En	999 9.5 En	R Cnc	004 [u Bl
038 7.9 Sm	099 10.4 Ca	035 6.5 Ht	003 9.6 En	081112	022 [u Bl
043 8.2 Bl	V Cam	036 6.3 Sm	006 10.3 Bl	021 8.2 Ch	058 [u Bl
S Aur	054974	039 6.6 En	013 10.7 Bl	035 8.6 Ch	W Cnc
052034	065 9.8 Pt	041 6.5 Ht	021 10.9 Bl	V Cnc	090425
093 8.6 Pt	093 11.2 Pt	048 6.5 Ht	021 10.7 En	081617	034 10.3 L
W Aur	RR Tau	051 6.3 Sm	025 11.4 En	021 8.5 Ch	050 10 6 L
052036	055326	051 6.6 En	029 11.3 Bl	030 8.9 Ch	RW Car
087 9.3 L	007 12.9 Bg	054 6.3 Sm	030 11.5 En	R Cha	*091868*
093 9.8 Pt	Z Aur	055 6.4 Ht	034 12.2 En	*082476*	962 12.2 Lo
T Ori	055353	061 6.3 Sm	035 11.9 Bl	951 11.2 Lo	004[12.8 Bl
053005a	061 10.0 Pt	062 6.5 Ht	043 11.9 Bl	972 9.9 En	005[12.2 En
959 8 8 An	065 10.0 Pt	069 6.3 Sm	051 12.5 Bl	981 10.1 En	021[12.2 En
984 10.5 An	093 10.8 Pt	073 6.5 Ht	051 12.2 En	993 10.0 En	022[12.8 Bl
S Cam	096 10.8 Pt	S Lyn	058 12.8 Bl	999 10.1 En	030[12.2 En
053068	R Oct	063558	S Gem	003 9.9 Ht	034[12.2 En
023 8.8 Wk	*055686*	022[10 3 Pt	*073723*	006 10.1 Bl	035[10.7 Lo
063 8.4 Wk	006 9.4 Bl	093 10.1 Pt	021[11.5 Ch	006 10.6 Sm	051[12.2 En
065 8.4 Pt	007 9.7 Sm	X Gem	W Pup	007 10.6 Lo	055[12.2 En
082 8.5 Wk	013 9.7 Bl	064030	*074241*	013 9.6 Bl	056[10.7 Lo
092 8.2 Wk	021 9.8 Bl	012 8.2 Bn	951 9.1 Lo	021 9.4 Bl	058[12.8 Bl
093 8.4 Pt	028 10.0 Sm		967 8.8 Lo	021 10.1 Ht	

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1927.

J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
Y VEL	X HYA	Z VEL	S CAR	RS HYA	RS CEN
092551	*093014*	*094953*	*100661*	*104628*	*111661*
962[12.4 Lo	020 13.1 Bg	062 10.3 Ht	090 6.0 Ht	007 10.2 Bl	051 9.5 Sm
004 12.9 Bl	024 13.0 Bg	069 10.7 Sm	091 6.3 Sm	022 10.2 Bl	056 9.8 Lo
008[12.4 Sm	025 13.0 Bg	073 10.7 Ht	Z CAR	029 10.1 Bl	058 9.6 Bl
021[12.4 En	032 12.8 Bg	078 10.9 Ht	*101058*	035 10.4 Bl	061 9.5 Sm
022 12.9 Bl	038 12.5 Bf	090 11.0 Ht	005[12.6 Bl	043 10.3 Bl	069 10.3 Sm
028[12.4 Sm	R LMI	091 10.9 Sm	008[12.3 Sm	051 10.7 Bl	091 12.7 Sm
030[12.1 En	093934	V LEO	028[12.3 Sm	058 10.8 Bl	X CEN
034[12.4 En	021 7.3 Ch	095421	029[12.6 Bl	W LEO	*114441*
051[12.4 En	023 7.5 Wk	056 12.8 Pt	034[12.3 En	104814	967 8.2 Lo
058 12.8 Bl	031 7.5 Ch	061[11.7 Ch	035[12.3 Sm	014 10.5 Bg	007 8.5 Bl
061 12.4 Sm	034 7.2 L	RR CAR	051[12.3 Sm	015 10.4 Bg	022 9.4 Bl
091[12.4 Sm	043 7.8 Ch	*095458*	051[12.3 En	020 10.5 Bg	029 9.7 Bl
R CAR	050 8.0 L	951 7.9 Lo	058[12.6 Bl	023 10.4 Bg	035 10.2 Lo
092962	051 8.7 Wk	035 8.4 Lo	061[12.3 Sm	025 10.3 Bg	035 9.9 Bl
951 7.9 Lo	056 8.8 Pt	056 8.0 Lo	062[12.3 En	030 10.4 Ch	043 10.0 Bl
004 5.4 Ht	061 8.5 Ch	RV CAR	091[12.3 Sm	032 10.2 Bg	058 11.0 Bl
004 5.6 En	066 8.2 L	*095563*	W VEL	037 10.2 Bg	W CEN
006 5.1 Bl	077 9.1 L	007 12.1 Bl	*101153*	044 10.2 Bg	*115058*
008 5.4 Sm	077 8.8 An	022 12.3 Bl	007 11.0 Bl	051 10.4 Bg	004 12.2 En
013 4.9 Bl	088 9.1 Be	029 12.7 Bl	008 11.4 Sm	056 10.4 Pt	005 12.0 Bl
018 4.7 Ht	088 9.0 L	058 13.3 Bl	022 11.7 En	061 10.3 Ch	022 10.9 Bl
021 4.4 Ht	R LEO	S CAR	028 12.0 Sm	RS CAR	024 11.3 En
021 4.9 En	094211	*100661*	029 11.5 Bl	*110361*	029 10.3 Bl
022 4.5 Bl	021 9.0 Ch	951 6.6 Lo	035 12.3 Bl	004[12.3 En	031 10.9 En
025 4.4 Ht	023 8.9 Wk	965 8.2 Lo	035 13.0 Sm	008[12.3 Sm	034 9.9 En
025 4.6 En	035 9.6 Ch	004 7.2 En	037[11.1 Lo	021[12.3 En	035 10.1 Lo
025 4.3 Sm	056 10.0 Pt	004 7.3 Ht	051[13.0 Sm	028[12.3 Sm	035 9.7 Bl
029 4.4 Bl	061 10.2 Ch	007 6.7 Bl	056[10.5 Lo	030[12.3 En	043 8.5 Bl
030 4.5 En	Z VEL	008 6.7 Sm	058[13.1 Bl	034[12.3 En	051 8.2 En
031 4.0 Sm	*094953*	014 7.0 En	061[13.0 Sm	035[12.3 Sm	051 8.6 Bl
034 4.4 En	004 9.2 Ht	018 6.5 Ht	069[12.0 Sm	051[12.3 Sm	055 8.3 En
035 4.8 Lo	004 8.5 En	021 6.5 En	091[12.0 Sm	051[12.3 En	056 8 8 Lo
035 3.8 Ht	007 8 9 Bl	022 6.6 Bl	R UMA	055[12.3 En	058 8.3 Bl
035 4.5 Bl	008 8.2 Sm	024 6.2 En	103769	061[12.3 Sm	060 8.4 En
036 4.3 Sm	013 8.6 Bl	025 6.2 Ht	021 9.9 Ch	069[12.3 Sm	R COM
039 4.6 En	018 8.5 Ht	028 6.2 Sm	029 8.3 Rt	091[12.3 Sm	115919
041 4.1 Ht	021 8.3 En	029 6.1 Bl	035 7.7 Ch	S LEO	030 9.0 Ch
043 4.5 Bl	022 8.6 Bl	030 5 8 En	054 7.1 Cb	110506	056 9.9 Pt
048 4.4 Ht	025 8.5 Fn	034 6.2 En	056 6.5 Pt	030 11.0 Ch	061 9.7 Ch
049 4.3 Sm	025 8.5 Ht	035 6.5 Lo	059 6.8 Ch	056 12.9 Pt	063 10.3 Kz
051 4.7 Bl	028 8.5 Sm	035 5.5 Bl	062 6 7 Rt	063[10.3 Ch	080 10.6 Pt
051 4.9 En	029 8.8 Bl	035 6.0 Sm	062 6.7 Jo	RY CAR	SU VIR
055 4.8 Ht	030 8.9 En	035 5.8 Ht	062 6.5 Wk	*111561*	120012
056 4.6 Sm	034 8.9 En	039 5.5 En	086 7.5 Wk	005[13.1 Bl	030[11.0 Ch
056 4.8 Lo	035 8.8 Bl	041 5.5 Ht	090 7.1 Ca	022[13.1 Bl	056 12.8 Pt
058 4.8 Bl	035 8.3 Ht	043 5.3 Bl	092 8.0 Wk	058[13.1 Bl	061[11.0 Ch
060 4 9 En	035 8.3 Sm	048 5.5 Ht	095 7 7 Rt	RS CEN	T VIR
061 4.9 Sm	037 9.1 Lo	051 5.2 Bl	111 8.6 Ca	*111661*	*120905*
062 4.9 Ht	041 8.9 Ht	051 5.5 Sm	V HYA	005 9.8 Bl	056 12.3 Pt
069 5.1 Sm	043 9.1 Bl	051 5.7 En	*104630*	007 9 6 Bl	R CRV
073 5.3 Ht	048 9.8 Ht	055 5.5 En	007 8.4 Bl	007 9.3 Lo	*121418*
078 5.4 Ht	051 9 4 En	055 5.2 Ht	021 8.7 Ch	008 9.5 Sm	007 8.4 Bg
085 5.7 Ht	051 9.4 Bl	056 6.0 Lo	022 8.5 Bl	022 8.2 Bl	008 8.3 Bf
090 6.0 Ht	051 9.0 Sm	058 5.0 Bl	029 8.6 Bl	028 8.0 Sm	023 8.5 Wk
091 6.0 Sm	055 9.9 Ht	060 5.5 En	030 8.4 Ch	029 7.9 Bl	025 8.0 Bf
X HYA	055 9.6 En	061 5.5 Sm	035 8.6 Bl	035 9.5 Lo	030 8.1 Bf
093014	056 10.0 Lo	062 5 0 Ht	043 8.4 Bl	035 8.3 Sm	031 8.0 Cl
007 13.0 Bg	058 9.3 Bl	067 5.5 Sm	043 8.7 Ch	035 8.8 Bl	040 8.0 L
010 13.1 Bg	061 9.8 Sm	073 5.0 Ht	051 8.7 Bl	043 8.5 Bl	040 8 0 Be
014 13.0 Bg	062 9.9 En	078 5.5 Ht	058 8.5 Bl	051 9.1 Bl	040 8.3 An

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1927.

J.D.	Est.	Obs.
R CRV		
121418		
051	8.7	Bf
056	9.0	Pt
063	9.1	Bu
067	9.2	L
067	9.2	Be
089	10.8	Bf
SS VIR		
122001		
040	7.6	L
040	7.7	Be
040	8.0	An
066	7.2	L
077	6.7	L
088	7.1	L
T CVN		
122532		
056	9.7	Pt
061	10.0	Ch
063	10.3	Kz
080	10.0	Pt
Y VIR		
122803		
007	13.1	Bg
015	12.7	Bg
023	12.5	Bg
025	12.4	Bg
028	12.3	Bg
037	11.8	Bg
040	10.9	L
044	10.9	Bg
051	10.7	Bg
062	10.2	Ie
066	9.8	L
066	10.2	An
075	10.1	Bf
088	10.3	Bf
088	9.9	Be
088	9.8	L
U CEN		
122854		
951	8.9	Lo
965	8.4	Lo
007	8.6	Bl
022	9.2	Bl
029	10.2	Bl
035	10.4	Lo
035	10.5	Bl
043	11.0	Bl
051	12.1	Bl
058	12.6	Bl
T UMA		
123160		
056	12.4	Pt
058	12.2	GC
067	11.1	Cb
074	10.0	Sg
075	9.3	Ch
078	9.0	Wk
079	8.8	Sg
080	8.9	Pt
090	8.1	Ca
095	7.7	Rt
097	7.7	Ca
102	7.7	Rt
107	7.0	Sg
108	8.0	Ls
109	8.0	Ls
110	8.1	Ls
111	7.4	Ca
R VIR		
123307		
999	8.9	Rt
021	10.1	Rt
041	10.9	L
056	11.4	Pt
063	9.8	Bu
066	10.2	L
066	9.8	An
077	9.0	L
080	8.3	Pt
092	7.7	L
092	7.8	Ca
RS UMA		
123459		
999	8.5	Rt
007	8.3	Bg
014	8.0	Bg
021	8.3	Rt
021	8.5	Ch
024	8.6	Bg
028	8.9	Bg
029	8.6	Rt
032	9.1	Bg
037	9.2	Bg
044	9.4	Bg
049	9.4	Ch
051	10.0	Bg
053	9.8	Sg
056	10.1	Pt
057	10.3	Ch
062	10.0	Rt
067	11.1	Cb
070	10.1	Jo
074	11.0	Sg
075	11.0	Bf
079	11.0	Sg
080	11.1	Pt
098	12.1	Bf
107	11.8	Sg
Y UMA		
123556		
049	8.9	GC
086	8.4	GC
S UMA		
123961		
036	11.2	Jn
041	11.2	An
043	11.2	L
043	11.3	Be
049	10.9	GC
053	11.4	Sg
055	12.1	An
056	12.0	Pt
057	11.6	Ch
058	12.0	GC
060	11.8	An
066	11.7	An
066	11.6	L
067	10.8	Cb
076	12.0	L
080	12.0	Pt
091	11.0	L
097	10.7	Ca
107	9.2	Sg
107	10.1	W
108	9.1	Ls
109	9.2	Ls
110	9.1	Ls
RU VIR		
124204		
056	11.8	Pt
063	11.8	Kz
067	10.5	Cl
U VIR		
124606		
056	9.9	Pt
080	8.7	Pt
U OCT		
121283		
967	10.7	Lo
004	12.7	Ht
006	13.2	Ht
021	13.2	Ht
022	13.4	Bl
025	13.2	Ht
028	13.2	Sm
035	11.2	Lo
035	13.2	Ht
036	13.2	Sm
036	12.6	En
054	13.2	Sm
055	13.2	Ht
059	13.6	Bl
061	13.2	Sm
062	12.6	En
065	13.2	Ht
090	13.2	Ht
091	12.9	Sm
R HYA		
132422		
003	7.3	En
006	7.4	Sm
007	7.5	Bl
014	7.0	En
022	6.0	Bl
023	6.8	En
025	6.7	Sm
027	6.5	Ch
028	6.7	En
029	5.6	Bl
031	6.6	Sm
034	6.2	En
035	6.0	Bl
038	6.0	Sm
038	5.8	L
043	5.8	Bl
049	6.0	Ch
050	5.5	L
051	5.8	Bl
052	6.0	En
056	6.0	En
056	5.8	Pt
057	5.3	Ch
058	5.7	Bl
059	5.8	En
061	5.8	En
061	5.5	Sm
067	4.9	Be
067	5.0	L
068	5.3	Ch
089	5.1	Sm
091	5.1	Sm
S VIR		
132706		
997	6.8	Rt
006	6.8	Sm
016	6.9	Wl
021	7.0	Rt
025	6.8	Sm
027	6.8	Ch
031	6.8	Sm
038	6.9	Sm
054	7.6	Sm
056	7.8	Pt
058	7.8	Cb
058	7.9	Ch
060	7.5	Sg
062	7.8	Rt
064	7.7	Sm
065	7.5	Wl
065	8.0	Lg
069	8.1	Lg
070	8.0	Lg
075	8.1	Ch
079	8.3	Wl
080	8.0	Pt
082	8.3	Lg
083	8.4	Lg
087	8.5	Lg
091	8.4	Sm
092	8.3	Ca
097	8.5	Lg
RV CEN		
133155		
951	8.0	Lo
965	7.6	Lo
007	7.5	Bl
022	7.8	Bl
029	8.0	Bl
035	8.2	Bl
043	8.6	Bl
051	8.4	Bl
059	8.5	Bl
T UMI		
133273		
095	10.6	Rt
102	10.2	Rt
T CEN		
133633		
003	8.2	En
004	8.2	Ht
007	8.0	Bl
007	8.2	En
008	8.1	Bf
014	8.2	En
018	7.9	Ht
021	7.8	Ht
022	7.0	Bl
023	7.1	En
025	6.9	Ht
025	6.9	En
028	6.8	En
029	6.2	Bl
030	6.3	Bf
031	6.4	En
034	6.5	En
035	6.2	Ht
035	6.3	Bl
038	6.4	Sm
039	6.4	En
041	6.1	Ht
043	5.9	Bl
048	6.2	Ht
051	5.7	Bl
052	6.3	En
055	6.2	Ht
056	6.3	En
058	5.8	Bl
061	6.3	En
065	6.2	Ht
065	6.2	Sm
090	7.4	Ht
091	7.4	Sm
RT CEN		
134236		
962	8.8	Lo
967	9.6	Lo
003	9.8	En
007	10.5	Bl
022	11.0	Bl
023	11.4	En
028	11.6	En
029	11.7	Bl
034	11.7	En
035	11.9	Bl
052	12.4	En
056	12.6	En
059	12.9	Bl
061	12.6	En
R CVN		
134440		
029	8.6	Rt
033	8.6	Rt
056	8.0	Pt
061	8.0	Gb
062	8.0	Rt
062	8.2	Jo
063	8.4	Wk
070	8.0	Jo
080	7.4	Pt
088	7.9	Wk
092	8.2	Wk
098	7.3	Rt
108	7.3	Ie
RX CEN		
134536		
005	11.4	Bl
022	10.2	Bl
029	10.8	Bl
035	10.5	Bl
043	10.6	Bl
051	10.7	Bl
058	10.6	Bl
T APS		
134677		
005	13.2	Bl
007	12.7	Sm
028	12.7	Sm
029	13.2	Bl
038	12.3	Sm
054	12.7	Sm
059	13.2	Bl
065	13.2	Sm
091	12.7	Sm
RR VIR		
135908		
056	13.0	Pt
Z BOO		
140113		
062	8.9	Ie
108	10.5	Ie
Z VIR		
140512		
040	11.5	GC
056	11.2	Pt
062	11.6	Cl
062	11.2	Ie
067	11.5	GC
RU HYA		
140528		
003	12.2	En
007	12.9	Sm
023	12.6	En
025	13.2	Sm

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1927.

J.D.Est.Obs.

RU HYA
140528
028 12.6 En
029 13.2 Bl
034[12.5 En
038[12.0 Sm
052[12.5 En
054[12.5 Sm
056[12.0 En
059 14.0 Bl
061[12.5 En
091[12.5 Sm

R CEN
140959
951 10.0 Lo
965 10.1 Lo
003 10.5 En
004 10.8 Ht
007 10.5 Bl
007 10.7 Sm
021 10.9 Ht
022 10.4 Bl
023 10.5 En
025 10.8 Ht
025 10.7 Sm
029 10.4 Bl
030 10.6 En
031 10.7 Sm
034 10.6 En
035 10.7 Lo
035 10.4 Bl
035 10.8 Ht
038 10.9 Sm
041 10.7 Ht
043 10.3 Bl
048 10.6 Ht
051 10.0 Bl
051 10.3 En
054 10.5 Sm
055 10.6 Ht
055 10.3 En
059 10.0 Bl
060 10.0 En
062 10.3 Ht
064 10.0 Sm
073 9.2 Ht
078 9.0 Ht
090 7.8 Ht
091 7.8 Sm

U UMI
141567
056 11.0 Pt
059 10.9 Ch
062 10.9 Wk
080 10.1 Pt
087 10.2 Wk
092 9.8 Wk

S Boo
141954
023 13.0 Ch
050 13.4 L
056 13.0 Pt

S Boo
141954
057[10.6 Ch
061 13.4 GC
069 13.6 L
083 13.3 L

RS VIR
142205
037 14.0 Bg
044 14.1 Bg
051 14.1 Bg
080 13.1 Pt

V Boo
142539a
020 8.5 Ho
022 9.0 Ch
029 9.0 Rt
041 9.4 L
041 9.6 An
050 9.2 L
056 9.6 Pt
057 9.7 Ch
061 10.0 Gb
062 9.2 Rt
062 9.5 Jo
062 10.2 Sg
069 9.5 L
070 9.6 Rt
070 9.8 Jo
080 9.8 Pt
083 10.0 Gb
086 9.5 Jo
088 9.5 L
095 9.4 Rt
096 10.0 Ca
097 10.5 Jo
102 9.4 Rt
108 9.4 Rt
107 9.5 Sg
107 9.9 W
110 9.3 Ls

R CAM
142584
067 10.3 Ie
097 9.7 Ca

R Boo
143227
022 8.6 Ch
029 8.6 Rt
051 7.1 Wk
052 7.5 Ch
056 6.9 Pt
056 7.1 Jo
057 7.5 Ch
058 7.5 Cb
062 6.5 Sg
062 7.2 Jo
067 7.0 Rw
070 7.0 Rt
070 7.0 Jo
080 7.4 Pt
092 8.1 Ca

J.D.Est.Obs.

R Boo
143227
095 8.2 Rt
097 8.4 Jo
099 8.5 Ca
102 8.6 Rt
108 8.9 Rt
110 9.2 Ls
111 9.0 Ca

V LIB
143417
067[13.0 GC

U Boo
144918
040 12.4 GC
058 11.8 GC

Y LUP
145254
005[13.7 Bl
007[12.8 Sm
029[13.7 Bl
031[12.8 Sm
038[12.8 Sm
054 12.8 Sm
059 11.3 Bl
064 12.8 Sm
091 10.5 Sm

S APS
145971
004 10.1 En
007 10.0 Bl
007 10.0 Sm
021 10.3 En
022 10.0 Bl
025 9.9 En
028 9.6 Sm
029 10.0 Bl
030 10.0 En
034 10.0 En
035 10.4 Sm
035 10.4 Lo
035 10.0 Bl
043 10.0 Bl
049 10.0 Sm
051 10.0 Bl
051 10.0 En
054 10.4 Sm
055 10.3 En
056 10.4 Lo
059 10.0 Bl
060 10.2 En
065 10.4 Sm
091 10.4 Sm

RT LIB
150018
080 9.1 Pt
082 10.0 Lg
083 10.0 Lg
087 9.6 Lg

T LIB
150519
082[12.9 Lg

J.D.Est.Obs.

T LIB
150519
083[13.0 Lg
087[13.0 Lg
096[13.2 Lg

Y LIB
150605
036 9.6 L
050 10.5 L
050 10.8 An
056 10.7 Pt
069 11.9 L
069 12.3 An
088 12.3 Be
088 12.4 L

S LIB
151520
027 11.0 Ch
043 10.8 L
059 9.5 Ch
067 9.1 L
067 9.1 Be
083 9.0 L

S SER
151714
053 12.4 L
056 12.9 Pt
066 11.7 Lg
068 11.6 Lg
069 12.3 L
082 11.3 Lg
083 11.3 Lg
083 12.4 L
085 12.6 Pt
095 12.3 Ie
096 11.4 Lg
097 11.4 Lg
098 11.5 Lg

S CRB
151731
021 11.9 Ch
030 10.4 Wl
034 10.4 Wl
056 12.5 Pt
060[10.3 Ch
062[12.4 Sg
062 [9.4 Wk
065 [9.8 Cb
069 11.8 Wl
079 12.5 Wl
084[12.3 Sg
085 12.4 Pt
087[10 9 Wk
096[12.4 Ca
107 12.5 Sg
107 12.5 W
108 10.7 Ya

RS LIB
151822
003 10.2 En
004 9.8 Ht
007 9.7 Bl

J.D.Est.Obs.

RS LIB
151822
007 10.2 Sm
021 10.9 Ht
022 10.3 Bl
024 10.6 En
025 11.1 Ht
025 11.2 Sm
028 11.2 En
029 10.9 Bl
031 11.2 Sm
035 11.0 Bl
035 11.2 En
035 11.4 Ht
036 11.4 Sm
043 10.6 Bl
049 11.5 Sm
050 11.5 Ht
051 11.3 Bl
052 11.5 En
053 11.6 L
055 11.5 Ht
056 11.5 Sm
056 11.4 En
059 11.3 Bl
061 11.2 En
062 11.5 Ht
064 13.1 Sm
069 11.2 L
069 11.2 An
077 11.3 Ht
083 10.8 L
092 10.6 Ht

RU LIB
152714
053 10.4 L
056 10.3 Pt
062 10.5 Sg
069 10.1 L
069 10.0 An
079 8.9 Wl
083 8.9 L
085 8.4 Pt

R NOR
152849
004 10.9 En
006 10.6 Sm
007 10.9 Bl
021 11.5 En
025 11.7 En
025 11.2 Sm
030 11.7 En
031 11.5 Sm
034 11.9 En
035 11.9 Bl
038 11.9 Sm
052 12.0 En
054 12.5 Sm
056 12.2 En
059 12.3 Bl
061 12.2 En

J.D.Est.Obs.

R NOR
152849
062 12.6 Sm
093 12.8 Sm

X LIB
153020
007 10.5 Bl
022 10.8 Bl
029 11.5 Bl
035 11.9 Bl
039 12.0 GC
059 13.5 Bl
067 13.2 GC

W LIB
153215
006[13.1 Bl
029[13.5 Bl
059[13.5 Bl
062[11.0 Sg
082 10.3 Lg
083 10.5 Lg
083 11.2 L
087 10.6 Lg
096 10.7 Lg
097 10.8 Lg

S UMI
153378
023 11.0 Ch
033 10.7 Rt
056 11.1 Pt
057 12.0 Ch
085 11.7 Pt
097 11.5 Ca
102[10.6 Rt

U LIB
153620a
006[12.9 Bl
029 12.2 Bl
035 11.8 Bl
039 10.3 GC
043 10.7 Bl
051 10.6 Bl
059 10.0 Bl
067 9.2 GC

T NOR
153654
004 10.4 Ht
006 10.2 Sm
021 11.6 Ht
025 11.9 Ht
025 11.1 Sm
031 11.1 Sm
035 12.8 Ht
038 12.2 Sm
050[12.8 Ht
054 13.1 Sm
055 13.0 Ht
062 13.0 Ht
064 13.1 Sm
078[13.1 Ht
090[12.8 Ht

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1927.

J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
T NOR	R CRB	R CRB	RZ Sco	R HER	W Sco
153654	154428	154428	*155823*	160118	*160519*
093[12.8 Sm	062 6.9 Jo	099 5.9 Ca	035 9.0 En	096 8.9 Jo	006 12.0 Bl
Z LIB	062 5.8 Cb	102 6.1 Pt	035 9.2 Ht	108 9.6 Cb	022 12.3 Bl
154020	062 6.1 Pt	103 6.1 Pt	036 9.0 Sm	RR HER	029 12.3 Bl
002 12.9 GC	062 6.2 Sg	103 6.0 Ca	041 9.3 Ht	160150	035 12.2 Bl
006 12.2 Bl	064 6.1 Pt	104 6.0 Ca	049 9.3 Sm	058 8.8 GC	051 12.6 Bl
022 12.3 Bl	064 6.0 Be	104 6.1 Pt	050 9.2 Ht	086 9.2 GC	059 13.0 Bl
029 13.0 Bl	065 6.1 Pt	107 6.1 Pt	052 9.2 En	U SER	RU HER
059 13.3 Bl	066 6.1 Pt	107 6.2 Sg	055 9.3 Ht	160210	160525a
067[13.0 GC	066 6.0 L	107 5.9 W	056 9.4 Pt	056 12.5 Pt	036 10.8 L
R CRB	066 6.2 An	108 5.7 Cb	056 9.3 Sm	082[12.0 Ie	045 11.1 L
154428	067 6.1 Pt	107 6.0 Ca	056 9.3 En	085 13.0 Pt	056 10.9 Pt
021 6.1 Ch	067 6.0 L	109 5.8 Bx	061 9.6 En	096[12.0 Ca	066 11.9 GC
022 6.1 Ch	067 5.8 Be	110 6.0 Rw	062 9.3 Ht	108[11.4 Ya	067 10.0 An
023 6.1 Ch	068 6.1 Pt	110 6.1 Jo	065 9.5 Sm	X Sco	067 11.3 L
026 6.0 Ch	068 6.1 Ch	111 6.0 Ca	077 9.5 Ht	*160221a*	085 11.2 Pt
026 6.2 Ho	069 6.1 Pt	112 6.1 Ca	085 10.0 Pt	006[13.0 Bl	089 11.5 L
028 6.0 Ch	069 6.0 L	X CRB	092 10.3 Ht	029[13.0 Bl	R Sco
029 5.8 Rt	069 6.3 An	154536	093 10.4 Sm	059 13.0 Bl	*161122a*
030 6.0 Ch	070 6.0 Jo	095 11.1 Ie	Z Sco	088 11.2 GC	003 10.2 En
031 6.1 Cl	070 6.1 Pt	R SER	*160021*	SX HER	004 10.3 Ht
033 6.0 Jn	071 6.1 Pt	154615	004[12.0 Ht	160325	007 10.2 Bl
034 6.1 Be	071 6.2 Sg	021 10.2 Ch	008[11.2 Sm	045 8.4 L	007 10.2 Sm
034 6.0 Ch	072 6.1 Pt	023 9.7 Wk	022[12.0 Ht	051 8.0 Pt	008 10.5 Bg
035 6.0 Ch	074 6.1 Pt	029 10.3 Rt	023[12.2 En	052 8.0 Pt	010 10.5 Bf
036 6.0 Jn	074 6.2 Sg	049 11.6 Ch	025[12.0 Ht	056 8.0 Pt	022 10.8 Ht
036 6.0 L	077 6.1 L	056 11.0 Pt	028 12.2 En	057 7.9 Pt	022 11.3 Bl
040 6.1 Be	079 6.1 Pt	058[11.3 Ch	029 12.5 Bl	057 7.7 L	023 11.3 En
043 6.0 Be	079 6.2 Sg	062 12.0 Sg	031[11.8 Sm	058 8.0 Pt	024 10.9 Bg
045 6.0 Be	080 6.1 Pt	085 12.1 Pt	035 12.2 En	059 8.0 Pt	025 11.2 Ht
045 5.9 Ch	082 6.0 L	096[12.6 Ca	035 12.0 Ht	060 8.0 Pt	025 11.5 Sm
047 6.2 Sg	083 6.5 Gb	V CRB	036[12.0 Sm	061 8.0 Pt	028 11.5 En
049 5.8 Ch	084 6.2 Sg	154639	049 11.8 Sm	062 7.9 Pt	028 11.7 Bg
050 6.0 Be	085 6.1 Pt	056 9.0 Pt	050 12.0 Ht	065 8.0 Pt	029 12.0 Bl
051 6.1 Pt	086 6.1 Pt	085 7.6 Pt	052 11.3 En	066 8.0 Pt	031 11.9 Sm
052 6.1 Pt	086 6.0 Be	099 7.1 Ca	054 11.5 L	067 8.0 Pt	032 11.7 Bg
052 6.1 Ch	086 6.0 Jo	108 7.2 Ya	054 11.6 Be	067 7.7 An	035 12.0 Bl
053 6.0 L	087 6.1 Pt	R LIB	055 11.8 Ht	068 8.0 Pt	035 12.0 En
053 6.0 Be	088 6.1 Pt	*154715*	056 11.2 En	069 8.1 Pt	035 12.0 Ht
053 6.1 Pt	088 6.0 L	108[11.0 Ya	056 11.8 Sm	070 8.0 Pt	036 12.0 Sm
053 5.8 Gb	088 6.0 Be	ST HER	059 11.0 Bl	071 8.1 Pt	037 12.2 Bg
054 5.8 Cb	088 6.1 Ch	154748	061 11.0 En	072 8.1 Pt	044 12.4 Bg
054 6.1 L	089 6.2 Pt	058 8.3 GC	064 11.1 Ht	074 8.0 Pt	050 13.6 Bg
054 6.1 Be	089 6.0 L	086 8.4 GC	065 10.9 Sm	080 8.0 Pt	050[12.4 Ht
055 6.0 L	089 6.1 Ca	RR LIB	076 10.7 L	083 7.8 L	051 12.8 Bl
055 6.0 Jn	090 6.1 Ca	*155018*	076 10.7 An	085 7.9 Pt	052 12.6 En
056 6.0 L	091 5.8 Gb	023[12.7 Ch	077 10.5 Ht	086 8.0 Pt	055[12.6 Ht
056 6.2 Pt	092 6.1 Ca	039[13.5 GC	092 10.1 L	087 8.0 Pt	056 12.2 Sm
056 6.1 Jo	092 6.0 L	053 14.5 L	092 10.3 Ht	088 8.0 Pt	056 12.8 Pt
057 6.1 Cb	093 6.1 Pt	083 14.0 L	093 10.1 Sm	089 8.1 Pt	059 13.0 Bl
057 6.1 Pt	094 6.1 Pt	RZ Sco	R HER	093 8.2 Pt	064[12.6 Ht
057 6.2 Sg	094 6.0 Gb	*155823*	160118	094 8.0 Pt	065[12.2 Sm
058 5.8 Cb	095 6.0 Bx	003 10.8 En	049 9.5 Ch	096 8.3 Pt	067[12.7 GC
058 6.2 Pt	096 6.1 Pt	004 11.2 Ht	056 9.1 Jo	097 8.2 Pt	075[12.5 Bf
058 6.2 Sg	096 6.2 Ca	007 10.4 Sm	056 8.8 Pt	099 8.2 Pt	083[12.7 GC
058 6.2 Ch	096 6.0 Jo	021 9.3 Ht	058 9.0 Ch	102 8.1 Pt	093[12.4 Sm
059 6.2 Pt	097 6.1 Pt	023 9.2 En	060 9.0 Sg	103 8.3 Pt	S Sco
060 6.1 Pt	097 6.0 Ca	025 9.3 Ht	079 8.2 Sg	104 8.4 Pt	*161122b*
060 5.7 Cb	097 6.1 Jo	025 9.0 Sm	079 8.6 Ch	107 8.1 Pt	003[12.4 En
061 6.1 Pt	098 6.1 Pt	028 9.1 En	085 8.7 Pt		007[12.4 Sm
061 6.1 Ch	099 6.1 Pt	031 8.8 Sm	095 8.9 Ie		008 14.2 Bg

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J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
S Sco	V Oph	S Oph	RR Oph	RR Sco	S Oct
161122b	*162112*	*162816*	*164319*	*165030*	*172486*
010 14.5 Bf	092 7.9 Ca	059[13.3 Bl	091 10.1 L	059 5.7 Bl	059 13 5 Bl
022[12.6 Bl	112 7.8 Ca	089 14.5 L	093 10.5 Sm	061 6.0 En	060[12.1 En
023[12.4 En	U Her	W Her	S Her	SS Oph	061[12.8 Sm
024 14.0 Bg	162119	163137	164715	*165202*	064[12.8 Ht
028 13.8 Bg	049 11.0 Ch	056 13.1 Pt	010 10.3 GC	056 8.0 Pt	090[13.0 Ht
028 12.8 En	056 10.5 Jo	086 11.6 Pt	035 10.6 Ch	086 9.1 Pt	093[12.8 Sm
031[12.2 Sm	056 11.1 Pt	087 11.6 Ie	056 11.3 Pt	RV Her	RU Oph
032 13.3 Bg	058 11.0 Ch	117 10.2 Sp	058 11.2 Ch	165631	172809
035 12.6 En	060 10.4 Sg	R UMi	065 11.6 GC	056 11.4 Pt	056 9.0 Pt
036[12.2 Sm	062 9.5 Jo	163172	084 11.5 GC	060 11.8 Sg	086 9.0 Pt
037 13.1 Bg	062 10.5 Wk	058 11.1 GC	086 12.0 Pt	062 12.0 Cl	RT Ser
044 12.3 Bg	070 9.5 Jo	R Dra	088 11.2 GC	082 12.5 Ie	*173212*
049 12.2 Sm	079 9.9 Pt	163266	095 11.8 Ie	086 13.1 Pt	089 12.2 L
050 12.4 Ht	084 9.9 GC	052 9.6 Ch	096 12.0 Ca	RT Sco	RU Sco
051 12.3 Bl	086 9.0 Pt	056 9.1 Jo	RS Sco	*165636*	*173543*
051 12.2 Bg	086 9.0 Jo	056 9.1 Pt	*164844*	029 13.5 Bl	007 11.6 Bl
052 12.2 En	090 9.2 Ca	058 9.1 Ch	004 11.3 Ht	059[14.0 Bl	022 11.5 Bl
055 12.0 Ht	092 8.8 Wk	064 8.8 Wk	004 11.2 En	R Oph	029 11.3 Bl
056 11.9 Sm	096 8.0 Jo	066 8.3 Jo	007 11.4 Sm	*170215*	036 11.2 Bl
056 12.0 En	107 7.5 Ca	067 9.3 Cb	007 11.2 Bl	026[10.2 Ch	044 11.3 Bl
056 11.9 Pt	108 7.6 Cb	086 7.8 Pt	022 11.8 Ht	095 13.1 Ie	052 11.1 Bl
059 11.7 Bl	109 7.4 Jo	086 7.9 Jo	022 11.3 Bl	RW Sco	059 11.1 Bl
061 11.9 En	Y Sco	087 8.1 Wk	023 12.1 En	*170833*	SV Sco
064 11.5 Ht	*162319*	092 7.9 Wk	025 11.4 Sm	029 13.5 Bl	*174135*
065 11.0 Sm	049 11.8 GC	095 8.0 Rt	025 11.9 Ht	036 12.3 Bl	007 9.8 Bl
068 11.4 GC	054 12.4 L	096 7.8 Ca	028 12.4 En	044 10.6 Bl	022 10.0 Bl
075 10.8 Bf	063 11.8 GC	096 7.8 Jo	029 12.2 Bl	052 10.5 Bl	029 10.6 Bl
077 10.5 Ht	083 12.8 L	109 8.0 Jo	031 12.1 Sm	059 9.6 Bl	036 11.2 Bl
083 10.8 GC	SS Her	S Dra	035 11.7 Bl	Z Oph	044 11.1 Bl
086 10.5 Pt	162807	164055	035 12.4 En	171401	052 11.9 Bl
088 10.9 Bf	036 9.3 L	058 8.9 GC	035 12.0 Ht	056 11.8 Pt	059 12.2 Bl
092 11.0 Ht	048 9.3 GC	086 8.4 GC	036 12.0 Sm	066 11.8 Lg	W Pav
093 10.7 Sm	054 9.7 L	RR Oph	044 12.0 Bl	086 11.0 Pt	*174162*
W CrB	056 9.6 Pt	*164319*	049[11.7 Sm	096 11.0 Ca	004[13.0 Ht
161138	062 9.9 Jo	004 10.8 En	050 12.0 Ht	117 10.1 Sp	022[13.0 Ht
062 10.7 Wk	076 11.8 L	008 10.0 Sm	051 12.0 Bl	118 10.0 Sp	025[13.0 Ht
082 8.9 Ie	082 12.4 Ie	010 9.8 Bf	052[12.0 En	RS Her	029[13.0 Bl
087 9.4 Wk	086 12.4 Pt	024 8.8 En	055[12.0 Ht	171723	031[13.0 Sm
092 9.0 Wk	091 13.0 L	025 8.4 Sm	056 11.7 Sm	056 12.8 Pt	036[13.0 Bl
097 8.8 Ca	T Oph	025 8.9 Bg	056[12.0 En	086 12.0 Pt	047[13.0 Sm
108 8.6 Sp	*162815*	028 8.6 En	059 12.2 Bl	S Oct	050[13.0 Ht
108 8.4 W	007 9.5 Bl	028 8.6 Bg	061[12.0 En	*172486*	052 12.7 Bl
112 8.4 Ca	022 10.3 Bl	031 8.4 Sm	064[12.0 Ht	004 10.6 Ht	052 12.4 En
117 9.0 Sp	029 10.7 Bl	032 8.8 Bg	065[12.0 Sm	004 10.3 En	055 12.5 Ht
118 8.7 Sp	035 11.2 Bl	035 8.6 En	092[12.0 Ht	007 10.5 Bl	056 12.1 En
W Oph	043 11.4 Bl	036 8.4 Sm	093[11.7 Sm	008 10.6 Sm	056 12.6 Sm
161607	051 11.6 Bl	037 9.0 Bg	RR Sco	021 11.9 Ht	059 11.4 Bl
030 11.4 Ch	054 11.8 L	044 8.9 Bg	*165030*	022 11.5 Bl	062 11.0 En
069 12.2 L	056 12.0 Pt	049 8.3 Sm	007 8.0 Bl	024 12.0 En	064 10.6 Ht
069 11.8 An	059 11.8 Bl	051 8.9 Bg	008 7.9 En	025 12.0 Ht	065 10.8 Sm
086 10.8 Pt	086 12.5 Pt	052 8.6 En	022 7.0 Bl	028 12.0 Sm	073 10.0 Ht
088 10.6 L	089 13.2 L	054 8.5 L	023 6.9 En	029 12.0 Bl	078 9.2 Ht
088 10.6 Be	S Oph	056 8.3 Pt	028 6.5 En	030 12.0 En	090 9.0 Ht
V Oph	*162816*	056 8.5 Sm	029 6.4 Bl	035 12.0 Sm	091 9.4 Sm
162112	007 10.4 Bl	056 8.6 En	035 6.4 En	035 12.4 Ht	RS Oph
056 7.6 Pt	022 10.7 Bl	065 9.2 Sm	035 6.2 Bl	036 12.4 En	174406
067 8.0 Bu	029 11.6 Bl	076 9.4 L	044 5.8 Bl	051[12.1 En	056 11.1 Pt
079 8.2 Ch	035 11.9 Bl	076 9.2 An	051 5.8 Bl	054 12.8 Sm	086 11.1 Pt
081 7.9 Bu	051 12.6 Bl	086 9.9 Pt	052 6.2 En	055[12.1 En	
086 7.6 Pt	054 13.0 L	088 10.0 Bf	056 6.0 En	055 13.0 Ht	

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J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
U ARA	R PAV	SV HER	R SCT	R SCT	Z LYR
174551	*180363*	182224	*184205*	*184205*	185634
004 9.8 En	091[11.9 Sm	086 10.2 Pt	065 5.4 Lg	104 5.4 Pt	057 9.5 Pt
007 9.7 Sm	T HER	087 10.1 L	065 5.3 Cb	107 5.5 Pt	086 10.9 Pt
023 10.8 En	180531	RX HER	066 5.6 Pt	107 5.6 Ca	RT LYR
025 10.8 Sm	020 8.5 Ho	182612	066 5.3 Lg	108 5.8 Rt	185737
028 11.0 En	021 8.3 Ch	061 8.0 GC	066 5.8 An	108 5.6 Sp	027 11.0 Ch
031 11.9 Sm	023 8.1 Wk	X OPH	067 5.6 Pt	109 5.3 Cb	V AQL
035[12.3 En	035 8.9 Ch	183308	067 5.5 Cb	111 5.4 Ca	*185905*
036 12.3 Sm	036 9.0 L	041 8.9 An	068 5.7 Pt	112 5.4 Ca	065 7.8 Cb
049[12.3 Sm	054 11.1 L	041 8.6 L	068 5.2 Lg	114 5.3 Sp	067 7.7 Cb
051[12.3 En	056 11.0 Jo	055 8.4 L	068 5.7 Ch	118 5.1 Sp	109 7.0 Cb
055[12.3 En	056 11.1 Pt	055 8.4 L	069 5.4 Lg	NOV AQL	R AQL
056[13.0 Sm	057 [9.5 Cb	055 8.4 Be	069 5.6 Pt	184300	190108
060[12.3 En	058 11.2 Ch	056 8.2 Jo	070 5.7 Jo	027 10.4 Ch	026 10.2 Ch
065[12.3 Sm	060 11.5 Sg	057 8.5 Pt	070 5.3 Lg	051 11.5 Pt	057 7.2 Pt
093[12.3 Sm	065 11.4 GC	061 8.8 GC	070 5.5 Pt	056 11.5 Pt	058 7.2 Ch
Z HER	067 11.4 GC	062 8.0 Jo	071 5.7 Pt	059 10.5 Ch	086 6.0 Pt
175315	076 12.5 L	070 8.3 Jo	072 5.5 Pt	059 11.6 Pt	092 6.2 Ca
061 7.6 GC	083 13.0 GC	086 8.1 Pt	073 5.3 L	062 10.7 Ie	109 5.8 Cb
090 7.8 GC	087 13.5 Pt	086 8.2 Jo	074 5.5 Pt	065 11.6 Pt	111 6.0 Ca
T DRA	091 13.3 L	087 7.9 L	079 5.8 Pt	080 11.6 Pt	V LYR
175458a	095[12.4 Bx	087 8.6 GC	080 5.9 Pt	085 11.6 Pt	190529a
057 9.9 Ch	096[12.4 Ca	096 8.4 Ca	082 5.8 Lg	093 11.4 Pt	057 9.6 Pt
087 12.4 GC	109[12.4 Bx	096 7.8 Jo	083 5.5 Lg	095 10.8 Ie	086 9.5 Pt
RY HER	W DRA	108 8.4 Rt	083 6.0 Gb	096 10.4 Ca	108 10.4 Ie
175519	180565	T AQL	085 6.0 Pt	107 11.2 Pt	RX SGR
021 9.8 Ch	056 9.7 Pt	184008	086 6.1 Pt	RX LYR	*190818*
027 9.6 Ch	087 10.2 Pt	061 9.7 GC	086 6.4 Jo	185032	065 12.1 Lg
035 9.3 Ch	NOV OPH	090 9.7 GC	087 6.0 Pt	027[10.9 Ch	066 12.1 Lg
049 8.6 Ch	180911	R SCT	087 6.0 L	S CRA	068 12.2 Lg
056 8.6 Pt	056[13.0 Pt	*184205*	087 5.9 Be	*185437a*	069 12.1 Lg
058 8.4 Ch	087[13.0 Pt	023 5.8 Gb	087 5.8 Lg	007 11.5 Bl	083 12.4 Lg
086 9.1 Pt	TV HER	035 5.8 Ch	088 6.0 Pt	029 11.5 Bl	086 11.4 Pt
V DRA	181031	045 5.3 L	089 6.2 Pt	036 11.4 Bl	087 12.2 Lg
175654	091 14.0 L	051 5.4 Pt	090 5.9 Be	044 11.6 Bl	096 12.6 Lg
056 12.4 Pt	RY OPH	052 5.4 Pt	090 6.2 Ca	052 12.1 Bl	097 12.6 Lg
R PAV	181103	053 5.6 Pt	092 6.2 Ca	059 12.1 Bl	099 12.6 Lg
180363	057 7.8 Pt	053 5.6 L	093 6.1 Pt	ST SGR	RW SGR
004 8.1 En	087 11.1 Pt	054 6.0 Cb	094 6.2 Pt	*185512a*	*190819a*
004 8.1 Ht	096 12.1 Ca	056 5.5 Jo	094 6.2 Gb	030 10.9 Ch	052 10.8 Ch
007 8.1 Sm	W LYR	056 5.4 L	095 6.1 Ie	052 10.2 Ch	057 10.9 Pt
008 8.2 En	181136	056 5.6 Pt	095 6.0 Rt	054 9.7 L	059 10.9 Ch
023 8.9 En	023 8.4 Wk	056 5.6 Ie	096 6.0 Jo	059 10.0 Ch	065 10.1 Lg
025 9.8 Sm	045 9.8 L	057 5.9 Cb	096 6.4 Lg	083 11.0 Lg	066 10.0 Lg
025 9.1 Ht	051 10.0 Wk	057 5.5 Pt	096 6.3 Ca	087 11.1 Lg	068 10.2 Lg
030 9.8 En	053 10.0 Sg	058 5.5 Pt	097 6.2 Ca	089 11.6 L	069 10.3 Lg
031 10.3 Sm	057 9.8 Pt	058 5.8 Cb	097 6.3 Pt	096 11.6 Lg	083 9.8 Lg
035 10.2 Ht	058 10.3 Cb	058 5.0 Sg	097 6.0 Lg	097 11.6 Lg	086 9.7 Pt
035 10.3 En	060 10.3 L	058 5.8 Ch	097 6.0 Gb	098 11.6 Lg	087 9.7 Lg
036 10.5 Sm	060 10.2 An	059 5.6 Pt	098 5.8 Lg	099 11.5 Lg	096 9.9 Lg
041 10.7 Ht	063 11.1 Wk	059 5.8 Gb	098 6.1 Sp	R CRA	097 10.0 Lg
049 11.1 Sm	086 12.1 Pt	060 5.9 Cb	098 6.3 Pt	*185537a*	098 10.9 Ch
050 11.6 Ht	089 12.1 L	060 5.7 Pt	098 6.3 Rt	007[12.5 Bl	TY AQL
051 11.3 En	096[12.4 Ca	061 5.5 Pt	099 6.0 Pt	029 12.8 Bl	190907
055 11.3 En	RV SGR	062 5.5 Pt	099 6.1 Ca	052 12.5 Bl	057 10.3 Pt
055 12.0 Ht	*182133*	062 5.8 Jo	099 5.6 Lg	059 12.5 Bl	086 10.0 Pt
056 11.3 Sm	029 14.7 Bl	062 5.9 Cb	102 5.6 Pt	T CRA	097 10.2 Ca
060 11.6 En	059 12.8 Bl	062 5.5 Ie	102 6.0 Rt	*185537b*	X LYR
064 12.5 Ht	SV HER	064 5.6 Pt	102 5.9 Sp	029 14.0 Bl	190926
065 12.1 Sm	182224	064 5.4 Lg	103 5.8 Ca	052[12.5 Bl	057 8.9 Pt
090[12.3 Ht	054 13.0 L	065 5.5 Pt	103 5.5 Pt		086 9.0 Pt

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J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
RS LYR	RY SGR	S SGR	T PAV	χ CYG	SY AQL
190933a	*191033*	*191319a*	*193972*	194632	200212
027[10.6 Ch	054 7.0 L	052 11.3 Bl	031 8.6 Sm	108 11.2 Cl	055 14.2 L
U DRA	055 7.2 Ht	057 11.6 Pt	035 8.2 Ht	RR SGR	057 13.0 Pt
190967	056 6.6 Pt	059 11.6 Bl	035 8.0 En	*194939*	083[13.0 Lg
057 12.1 Pt	056 7.0 En	086 13.0 Pt	036 8.0 Bl	007 11.9 Bl	088 12.5 Pt
086 12.6 Pt	056 7.3 Sm	097[12.2 Ca	036 8.0 Sm	022 10.8 Bl	090[13.7 L
W AQL	057 6.6 Pt	SW SGR	041 8.6 Ht	036 10.0 Bl	S CYG
191007	058 6.7 Pt	*191331*	044 8.5 Bl	044 8.3 Bl	200357
035 11.6 Ch	059 6.5 Pt	007 12.1 Bl	049 7.9 Sm	052 7.3 Bl	035 10.3 Ch
057 12.5 Pt	059 6.5 Bl	022 10.7 Bl	050 9.2 Ht	059 7.3 Bl	057 9.6 Pt
097[12.6 Ca	059 7.0 Ch	036 10.3 Bl	051 9.2 En	RU SGR	058 9.3 Ch
T SGR	060 6.4 L	044 10.0 Bl	052 8.5 Bl	*195142*	058 10.2 Sg
191017	060 6.6 Pt	052 10.5 Bl	055 9.4 En	004[12.5 Ht	066 9.3 Ch
052 11.2 Ch	061 6.6 Pt	059 10.5 Bl	055 9.2 Ht	006 12.4 Bl	085 9.3 Ch
057 11.1 Pt	061 6.9 Sm	TZ CYG	056 9.2 Sm	025 12.5 Ht	088 11.0 Pt
059 11.0 Ch	061 6.9 En	191350	059 9.1 Bl	028 12.5 Sm	R CAP
070 10.6 GC	064 7.0 Sm	057 10.3 Pt	060 9.5 En	029 13.5 Bl	*200514*
086 9.5 Pt	064 6.9 Ht	086 10 0 Pt	064 9.8 Ht	035 12.5 Ht	057 12.8 Pt
R SGR	065 6.8 Sm	U LYR	065 10.5 Sm	035 12.1 Sm	098 12.5 Pt
191019	065 6.5 Pt	191637	073 10.5 Ht	051 12.1 Sm	SV CYG
052 8.6 Ch	066 6.6 Pt	057 9.5 Pt	090 11.9 Ht	052 12.1 En	200647
057 8.4 Pt	066 6.4 L	086 9.5 Pt	091 11.9 Sm	055 12.0 Ht	070 9.6 Rt
059 8.5 Ch	066 7.2 An	TY CYG	RT CYG	056 12.0 En	102 9.5 Rt
074 7.8 Ch	068 6.8 Ch	192928	194048	059 12.0 Bl	108 9.3 Rt
086 6.9 Pt	069 7.0 Sm	057 11.0 Ch	027 8.5 Ch	061 11.9 Sm	S AQL
090 7.4 Ca	069 6.3 Pt	057 10.5 Pt	035 9.2 Ch	061 11.6 En	200715a
097 7.1 Ca	070 6.5 Pt	086 9.0 Pt	056 10.2 Jo	065 11.6 Ht	052 10.0 Ch
098 6.9 Rt	071 6.3 Pt	RT AQL	056 10.4 Wk	090 7.9 Ht	057 9.8 Pt
098 7.0 Sp	073 6.9 Ht	193311	057 9.9 Ch	091 7.8 Sm	058 10.0 Ch
103 6.6 Ca	077 6.9 Ht	057 13.9 Pt	057 9.9 Pt	RR AQL	083 9.3 Lg
108 7.0 Sp	079 6.5 Ch	086 13.4 Pt	059 8.9 Sg	*195202*	086 9.4 GC
112 6.4 Ca	080 6.6 Pt	R CYG	060 10.0 Cb	088 11.1 Pt	087 9.3 Lg
118 7.3 Sp	085 6.4 Pt	193449	064 9.7 Wk	RS AQL	088 9.0 Pt
RY SGR	086 6.3 Pt	027 10.5 Ch	070 9.2 Rt	*195308*	096 9.5 Pt
191033	088 6.4 Pt	054 10.1 Cb	084 12.0 Sg	097[12.2 Ca	097 9.4 Pt
004 7.3 Ht	089 6.5 Pt	056 11.0 Jo	086 11.6 GC	Nov CYG	098 9.4 Lg
005 7.0 En	089 6.5 Bf	057 11.8 Ch	088 12.0 Pt	195553	099 9.5 Lg
006 7.3 Bl	090 6.9 Ht	057 11.0 Pt	TU CYG	051[12.2 Pt	RW AQL
007 7.3 Bl	091 6.8 Sm	062 10.4 Jo	194348	056[12.2 Pt	200715b
022 6.3 Bl	092 6.6 L	065 12.3 Cb	027 9.4 Ch	059[12.2 Pt	057 9.3 Pt
022 6.9 Ht	093 7.0 Sm	070 11.0 Jo	035 9.4 Ch	065[12.2 Pt	083 9.0 Lg
024 6.3 En	097 6.3 Pt	086 12.5 GC	057 10.6 Ch	080[12.2 Pt	087 9.4 GC
025 6.9 Ht	098 6.3 Pt	088 12.3 Pt	057 10.5 Pt	086[12.2 Pt	087 9.2 Lg
025 6.9 Sm	099 6.4 Pt	109 13.0 Cb	χ CYG	093[12.6 Pt	088 9.3 Pt
028 7.0 Sm	102 6.3 Pt	RV AQL	194632	107[12.2 Pt	096 9.4 Lg
029 6.6 Bl	103 6.3 Pt	193509	022 8.0 Ch	Z CYG	097 9.1 Lg
030 6.8 En	104 6.3 Pt	088 12.5 Pt	030 8.6 Ch	195849	098 9.1 Lg
035 7.1 En	107 6.4 Pt	098 11.8 Lg	041 8.4 L	030 8.6 Ch	099 9.2 Lg
035 7.3 Ht	TV SGR	T PAV	041 8.1 An	035 8.5 Ch	R TEL
035 7.0 Sm	*191124*	*193972*	050 8.8 Ch	052 8.6 Ch	*200747*
036 7.3 Sm	029 13.5 Bl	004 7.6 Ht	055 9.3 L	056 8.7 Jo	006 12.6 Bl
036 7.1 Bl	036 12.9 Bl	005 7.2 En	056 9.0 Jo	057 8.5 Pt	029 12.4 Bl
038 7.5 Ht	044 11.7 Bl	007 7.4 Sm	056 8.8 Cl	058 8.5 Ch	059 12.5 Bl
041 7.7 Ht	052 11.8 Bl	007 7.5 Bl	057 9.5 Ch	066 8.5 Jo	W CAP
044 7.5 Bl	059 10.8 Bl	022 7.8 Ht	057 9.3 Pt	088 9.5 Pt	*200822*
045 7.6 Ch	S SGR	022 7.4 Bl	060 9.8 Ch	S TEL	007[12.5 Bl
051 6.8 Bf	*191319a*	023 7.7 En	066 9.8 Jo	*195855*	029[13.5 Bl
051 7.5 Sm	007 10.3 Bl	025 8.0 Sm	068 10.1 Ch	029 12.8 Bl	059[12.8 Bl
052 7.3 En	022 10.1 Bl	025 7.9 Ht	087 10.7 L	059 12.8 Bl	095[10.2 Rt
052 7.4 Bl	036 10.6 Bl	029 7.8 Bl	088 10.8 Pt		
054 7.5 Sm	044 10.9 Bl	031 8.0 En			

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1927.

J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
Z AQL	RT SGR	SZ CYG	T DEL	RS CAP	T CAP
200906	*201139*	202946	204016	*210116*	*211615*
057 13.4 Pt	059 10.5 Bl	080 9.3 Pt	059 10 0 Ch	102 7.9 Rt	029 12.8 Bl
088 10.1 Pt	WX CYG	082 9.5 Pt	088 11.6 Pt	V CAP	059[12.7 Bl
RS CYG	201437b	085 9.1 Pt	108 12.0 Cl	*210174*	S MIC
200938	978 10.7 Ch	086 9.2 Pt	V AQR	029 12.8 Bl	*212030*
022 7.5 Ch	001 11.6 Pt	087 9.2 Pt	204102	059[12.7 Bl	044 9.5 Bl
026 7.7 Ch	052 11.3 Ch	088 9.3 Pt	057 8.6 Pt	TW CYG	059 10.0 Bl
027 7.7 Ch	057 12.3 Pt	089 9.5 Pt	059 8.8 Ch	210129	065 9.7 Sm
030 7.7 Ch	059[11.3 Ch	093 9.4 Pt	088 8.8 Pt	067 12.8 Ie	Y CAP
035 7.4 Ch	073 12.9 L	094 9.4 Pt	W AQR	095 12.4 Ie	*212814*
041 7.3 An	084[12.1 Sg	096 9.2 Pt	*204104*	X CAP	059[12.9 Bl
041 7.2 L	088 12.6 Pt	097 9.2 Pt	056 9.7 L	*210221*	W CYG
045 7.2 Ch	107[11.7 Sg	098 9.0 Pt	073 10.1 L	029 11.5 Bl	213244
050 7.2 Ch	U CYG	099 9.1 Pt	092 10.4 L	059 12.6 Bl	040 6.0 L
052 7.3 Ch	201647	102 9.3 Pt	U CAP	RS AQR	053 5.8 L
056 7.3 Jo	022 8.7 Ch	103 9.1 Pt	*204215*	*210504*	060 6.6 L
057 8.1 Sg	045 9.3 Ch	104 9.1 Pt	029[13.5 Bl	056 10.0 L	066 6.2 An
057 7.3 Pt	056 7.9 Jo	107 9.4 Pt	059[13.5 Bl	058 12.4 Pt	067 6.2 L
057 7.8 Ch	057 8.4 Pt	ST CYG	T AQR	073 10.1 L	069 6.4 L
058 7.5 Ch	057 10.0 Ch	202954	*204405*	092 14.2 L	087 6.0 L
059 7.5 Ch	059 7.5 Gb	057 11.7 Pt	045 10.8 Ch	Z CAP	S CEP
060 7.8 Ch	062 8.4 Jo	088 10.6 Pt	057 11.6 Pt	*210516*	213678
065 7.3 Ch	065 10.0 Cb	108 10.7 Ie	066 11.5 Lg	058 13.0 Pt	059 8.6 Pt
066 7.2 Ch	066 8.0 Jo	V VEL	068 11.7 Lg	098 10.5 Pt	098 8.5 Pt
066 7.2 Jo	086 8.7 Jo	203226	082 13.0 Lg	R EQU	RU CYG
068 7.3 Ch	088 9 2 Pt	057 8.5 Pt	083 13.0 Lg	210812	213753
070 7.2 L	096 8.5 Jo	088 8.6 Pt	087 13.2 Lg	058 14.2 Pt	023 7.1 Wk
074 7.6 Ch	102 9.0 Sp	R MIC	088 12.6 Pt	T CEP	051 7.0 Wk
077 7.3 L	109 9.7 Sp	*203429*	096 13.5 Lg	210868	058 7.0 Ch
077 7.8 An	109 10.3 Cb	007 8.9 Bl	098 13.6 Lg	023 8 3 Wk	059 7.2 Pt
084 8.2 Sg	112 9.6 Ca	022 8.8 Bl	099 13.6 Lg	027 8.1 Ch	064 7.1 Wk
086 7.5 Jo	117 10.0 Sp	036 9.8 Bl	RZ CYG	051 7.6 Wk	086 7.3 Wk
088 7.4 Pt	U MIC	044 10.6 Bl	204846	056 7.1 Jo	098 7.8 Pt
090 7.5 GC	*202240*	059 12.7 Bl	057 13.1 Pt	056 7.2 L	RV CYG
092 7.3 L	007[13.0 Bl	S DEL	060[11.9 Sg	057 7.9 Ch	213937
096 7.2 Jo	029[13.6 Bl	203816	088 12.5 Pt	059 7.6 Pt	059 6.5 Pt
107 7.2 Sg	059[13.6 Bl	057 9 0 Pt	S IND	059 7.5 Gb	098 6.5 Pt
109 7.2 Sp	Z DEL	088 9.1 Pt	*204954*	059 7.9 Ch	RR PEG
R DEL	202817	V CYG	006 8.5 Bl	064 7.5 Sg	214024
201008	057 11.4 Pt	203847	022 8.3 Bl	064 7.8 Wk	059 13.2 Pt
052[10.8 Ch	088 12.9 Pt	030 9.9 Ch	029 8.6 Bl	066 7.9 Ch	098 14.0 Pt
055[12.4 L	SZ CYG	057 9.5 Pt	036 8.8 Bl	070 6.6 Jo	R GRU
057 12.5 Pt	202946	057 10.0 Ch	044 8.9 Bl	070 6.3 Ca	*214247*
059[10.8 Ch	051 9.4 Pt	062 9.1 Jo	059 9.8 Bl	075 7.0 Ch	007 8.6 Bl
088 13.6 Pt	052 9.3 Pt	066 9.0 Jo	X DEL	086 8.3 Gb	022 7.9 Bl
092 13.3 L	056 8.0 Pt	088 11.4 Pt	205017	086 6.5 Jo	035 7.4 Sm
095[12.3 Bx	057 9.0 Pt	Y AQR	057 13.8 Pt	087 6.8 Wk	036 7.6 Bl
109[12.3 Bx	058 9.1 Pt	*203905*	R VUL	090 6.4 Ca	038 8.1 Ht
RT CAP	059 9.4 Pt	066 11.6 Lg	205923	091 6.3 L	044 8.1 Bl
201121	060 9.5 Pt	068 11.6 Lg	052 10.0 Ch	092 6.7 Wk	051 8.0 Sm
095 7.3 Rt	061 9.5 Pt	082 11.2 Lg	056 9.0 Jo	096 6.4 Jo	055 8.4 En
SX CYG	062 9.5 Pt	083 11.4 Lg	058 9.4 Pt	098 6.2 Pt	055 8.6 Ht
201130	065 9.5 Pt	087 11.8 Lg	059 9.7 Ch	107 6.3 Ca	059 8.5 Bl
057 13.6 Pt	066 9.5 Pt	096 12.1 Lg	060 8.5 Sg	RR AQR	060 8.6 En
088 13.1 Pt	067 9.4 Pt	097 12.1 Lg	070 8.8 Jo	*210903*	061 8.6 Sm
RT SGR	068 9.0 Pt	098 12.1 Lg	086 7.8 Jo	059 13.5 Pt	065 8.6 Ht
201139	069 8.9 Pt	099 12.1 Lg	096 7.8 Jo	098 11.6 Pt	090 9.7 Ht
007 7.4 Bl	070 8.8 Pt	T DEL	098 7.8 Pt	X PEG	091 9.9 Sm
022 8.3 Bl	071 9.0 Pt	204016	RS CAP	211614	U AQR
036 9.1 Bl	072 9.0 Pt	052 10.0 Ch	*210116*	059 12.8 Pt	*215717*
044 9.6 Bl	074 9.2 Pt	057 10.0 Pt	095 8.1 Rt		059 11.9 Pt

Variable Star Observations Received During July and August, 1927.

J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.	J.D.Est.Obs.
U Aqr	RS Peg	R Ind	R Peg	V Phe	R Aqr
215717	220714	*222867*	230110	*232746*	*233815*
098 11.7 Pt	051 12.3 Bf	006 13.2 Bl	065 10.2 Lg	092 11.7 Ht	059 7.7 Bl
RT Peg	089 13.4 Bf	029[12.5 Bl	066 10.2 Lg	093 10.8 Sm	062 7.6 Ch
215934	X Aqr	059[13.0 Bl	068 10.2 Lg	Z And	092 8.5 Ht
059 11.6 Pt	*221321*	T Tuc	082 9.8 Lg	232848	096 8.3 Ca
066[11.7 Ch	010 14.5 Bf	*223462*	083 9.8 Lg	059 9.3 Pt	099 8.5 Pt
098 10.8 Pt	029 14.3 Bf	038 13.0 Ht	096 9.7 Lg	079 9.6 Ch	RR Cas
RV Peg	051[10.7 Bf	051[11.8 Sm	097 9.6 Lg	099 9.5 Pt	235053
220133a	T Gru	055 13.0 Ht	098 9.5 Lg	ST And	096[13.1 Bn
059 12.0 Pt	*221938*	061[12.3 Sm	098 9.0 Pt	233335	V Cet
098 9.0 Pt	064[11.6 Sm	065 13.0 Ht	098 9.0 Rt	023 9.6 Gb	*235209*
RZ Peg	091 11.6 Sm	090 10.9 Ht	099 9.4 Lg	059 9.3 Pt	059[12.8 Bl
220133b	S Gru	091 11.1 Sm	099 9.1 Ca	064 9.5 Lg	R Tuc
059 10.2 Pt	*221948*	R Lac	102 8.7 Rt	065 9.6 Lg	*235265*
T Peg	038 10.0 Ht	223841	V Cas	066 9.9 Lg	093n13.0 Sm
220412	055 10.7 Ht	056 9.6 L	230759	068 10.0 Lg	R Cas
056 10.6 L	055 10.4 En	059 10.4 Pt	092 10.0 Ca	079 9.0 Ch	235350
066[11.1 Ch	056 10.0 Sm	092 11.6 L	098 9.8 Pt	082 9.2 Lg	086 7.5 Jo
073 12.3 L	060 10.4 En	RW Peg	107 9.1 Ca	083 9.2 Lg	090 7.3 Ca
Y Peg	064 11.1 Sm	225914	W Peg	090 8.9 Ca	096 7.3 Jo
220613	065 11.2 Ht	010 11.4 Bf	231425	094 9.0 Gb	097 6.8 Ca
010 11.1 Bf	091 12.6 Sm	029 9.2 Bf	056 11.1 L	096 8.7 Lg	104 6.8 Ca
029 11.0 Bf	092 12.4 Ht	051 9.4 Bf	073 10.7 L	097 8.9 Lg	Z Peg
051 11.9 Bf	S Lac	059 9.5 Pt	S Peg	098 8.9 Lg	235525
059 12.6 Pt	222439	098 11.3 Pt	231508	099 8.9 Lg	059 10.2 Pt
089 14.5 Bf	056 11.8 L	108 11.9 Ie	059 10.4 Pt	099 8.6 Pt	099 8.7 Pt
RS Peg	059 10.9 Pt	R Peg	099 8.5 Pt	R Aqr	SV And
220714	087 9.1 L	230110	V Phe	*233815*	235939
010 12.1 Bf	098 9.0 Pt	023 7.8 Gb	*232746*	059 7.6 Pt	059 13.0 Pt
029 12.4 Bf	108 7.6 Ie	059 8.1 Pt	055[12.7 Ht		

Rapidly Varying Irregular Variables.

Star J.D. Est.Obs.	J.D. Est.Obs.	Star J.D. Est.Obs.	J.D. Est.Obs.
005840 RX Andromedae—		213843 SS Cygni—	
5056.8 12.8 Pt	5085.7 11.5 Pt	5034.4 9.1 L	5057.8 11.1 Sg
5059.7 13.0 Pt	5089.9 11.5 Pt	5035.2 8.4 Ch	5058.2 11.7 Ch
5061.8 11.5 Pt	5093.9 13.0 Pt	5035.4 8.5 L	5058.7 11.7 Pt
5065.9 11.6 Pt	5096.8 13.0 Pt	5040.4 9.5 L	5058.8 11.8 Sg
5066.8 11.9 Pt		5041.4 9.6 L	5059.2 11.7 Ch
		5041.4 10.1 An	5059.7 11.7 Pt
060547 SS Aurigae—		5043.4 9.6 L	5060.7 11.8 Sg
5007.1[12.4 Bf	5073.6[12.0 L	5045.2 11.6 Ch	5061.7 11.8 Pt
5008.1[12.2 Bf	5087.6[13.0 L	5049.7 11.4 GC	5062.6 11.2 Cl
5021.1 10.8 Ch	5093.9[12.6 Pt	5051.7 11.7 Pt	5062.7 11.8 Ie
5022.1 10.9 Ch	5096.8[12.4 Pt	5052.2 11.8 Ch	5062.7 11.8 Pt
5050.4[12.4 L	5098.9[13.3 Lg	5052.6 11.6 Ie	5062.8 11.8 Sg
5060.6 12.4 L		5052.7 11.7 Pt	5064.7 11.8 Sg
		5053.5 11.3 L	5065.4 11.5 Ch
074922 U Geminorum—		5054.5 11.5 L	5065.7 11.7 Pt
5006.6[13.3 GC	5020.1 13.9 Bg	5055.5 11.2 L	5066.2 11.6 Ch
5007.1[13.3 Bg	5021.6[13.7 GC	5055.6 11.6 Ie	5066.4 11.1 L
5008.2[13.3 Bg	5025.1 14.0 Bg	5055.5 11.1 Be	5066.4 11.1 An
5010.1[13.9 Bg	5030.1[11.4 Bf	5056.6 11.0 L	5066.8 11.7 Pt
5014.1[13.3 Bg	5032.1 14.0 Bg	5056.6 11.6 Cl	5067.4 10.5 L
5015.1 13.3 Bg	5035.1 [9.6 Ch	5056.8 11.5 Pt	5067.4 10.8 An
5016.6[13.3 GC	5037.1[13.3 Bg	5057.2 11.6 Ch	5067.4 10.6 Be
5019.6 13.7 GC	5043.4[10.9 L	5057.7 11.6 Pt	5067.6 11.4 Cl

VARIABLE STAR OBSERVATIONS RECEIVED DURING JULY AND AUGUST, 1927.
RAPIDLY VARYING IRREGULAR VARIABLES—Continued.

Star	J.D.	Est.	Obs.	J.D.	Est.	Obs.	Star	J.D.	Est.	Obs.	J.D.	Est.	Obs.
213843 SS CYGNI—							213843 SS CYGNI—						
	5067.7	11.1	Ie	5080.7	9.2	Pt		5090.4	11.0	Be	5099.6	11.6	Ca
	5067.7	11.0	Cb	5082.4	9.4	L		5090.4	10.9	L	5099.7	11.7	Pt
	5067.7	11.7	Pt	5082.6	9.2	Ie		5091.4	10.9	L	5102.7	11.8	Pt
	5068.2	11.7	Ch	5084.7	10.0	Sg		5092.2	11.1	L	5103.6	11.7	Cl
	5068.7	11.7	Pt	5085.7	10.6	Pt		5092.6	11.6	Ca	5103.7	11.8	Pt
	5069.4	11.0	An	5086.6	11.1	Ie		5093.9	11.5	Pt	5104.6	11.6	Ca
	5069.8	11.6	Pt	5086.7	11.5	Pt		5094.7	11.7	Pt	5104.7	11.7	Pt
	5070.6	11.5	Ie	5086.7	11.0	Gb		5095.2	11.1	Bx	5107.6	11.4	Ca
	5070.7	11.7	Pt	5087.6	11.8	Ie		5095.6	11.6	Ie	5107.1	11.7	Pt
	5071.8	11.5	Pt	5087.6	11.6	L		5095.6	10.6	Cl	5107.7	11.5	Sg
	5071.8	11.8	Sg	5087.7	11.7	Pt		5096.6	11.9	Cl	5108.6	[9.9	Ls
	5072.7	11.5	Pt	5088.4	11.6	L		5096.6	11.8	Ca	5108.6	11.9	Cl
	5073.6	10.7	L	5088.4	11.1	Be		5096.8	11.5	Pt	5108.6	11.8	Ie
	5074.7	11.0	Sg	5088.7	11.7	Pt		5097.6	11.7	Ca	5109.6	[9.9	Ls
	5074.7	11.7	Pt	5089.6	11.6	Ca		5097.6	11.3	Cl	5109.7	11.8	Bx
	5075.2	11.6	Ch	5089.7	11.0	Gb		5097.7	11.7	Pt	5110.5	11.5	Ca
	5079.2	8.4	Ch	5089.8	11.7	Pt		5098.7	11.7	Pt	5111.5	9.2	Ca
	5079.7	8.7	Sg										

Total observations, 3211; Total variables, 368; Total observers, 35.

Jose, and O. C. Wilson of Berkeley; and Mr. H. P. Spears of Binghamton, N. Y.

The Annual meeting of the Association will be held on October 22 at the Harvard Observatory, Cambridge, Mass. We anticipate a large attendance and we hope that members will come prepared to submit papers dealing with their work, preferably illustrated with slides.

The following observers have contributed to the results here presented: Ancarani, "An"; Baldwin, "Bl"; Bappu, "Bf"; Barnes, "Bx"; Benini, "Be"; Bhaskaran, "Bg"; Brown, "Bn"; Bush, "Bu"; Carr, "Ca"; Chandra, "Ch"; Cherrington, "Cb"; Clement, "Cl"; Ensor, "En"; Gaebler, "Gb"; Houghton, "Ht"; Howe, "Ho"; Iedema, "Ie"; Johnstone, "Jn"; Jones, "Jo"; Kurtz, "Kz"; Lacchini, "L"; Leavens, "Ls"; Logan, "Lg"; Long, "Lo"; Peltier, "Pt"; Rittenberg, "Rt"; Rowley, "Rw"; Skaggs, "Sg"; Smith, "Sm"; Spears, "Sp"; Watkins, "Wk"; Wilson, "W"; Williams, "Wl"; Yalden, "Ya"; and the Georgetown College Observatory, "GC".

September 6, 1927.

LEON CAMPBELL, Recording Secretary.

METEOR NOTES.

By CHARLES P. OLIVIER.

Since the last communication we have had the pleasure of admitting the following persons to the American Meteor Society.

Vincent Anyzeski	19 Pardee St., New Haven, Conn.
Benjamin A. Darling	4023 Smith Ave., Everett, Wash.
James H. Kilen	417 May St., Hood River, Ore.
James H. Logan	3514 Cedar Springs Road, Dallas, Texas.
C. M. Pegues	Box 42, Georgetown, Ky.
W. O. Swinyard	467 Boulevard, Logan, Utah.

As before requested all members, old and new, should make an effort to get

into touch with others in their neighborhood who are interested in astronomy. In this way valuable members may be obtained not only for the A.M.S. but also for some of the other astronomical societies in the United States, all of which deserve support.

The writer, having just returned from his vacation, has not had time to really work up any of the interesting observations that have come in during the past month. Hence they can be only briefly mentioned here. Good reports have been received from R. A. McIntosh of New Zealand, and in this country from F. J. Carr in Vermont, A. S. Lawrence in New York, J. H. Logan, O. E. Monnig, and C. M. Pegues in Texas, and Goodrich Watkins in Idaho. Three of these observers sent in regular observations for the first time this summer. Thanks largely, it is believed, to the founding of the Ft. Worth Astronomical and Physical Society our membership in Texas has largely increased, and on many nights good series of observations have been made in that state.

Brilliant moonlight this year near the time of the Perseid maximum doubtless discouraged many persons at this most prolific epoch. But it is possible that we still will have belated reports to come from others not mentioned above. The months of June, July, and August furnished us with many brilliant fireballs and one meteorite. This last fell, according to reports that seem entirely trustworthy, at Tilden, Ill., on July 13 at 12:25 P.M. The most complete account was from Mr. Harry L. Hirte of that town, in which he gave a diagram of the distribution of the four pieces picked up. They were said to weigh 115, 47, 9, and 3½ pounds, respectively. The meteorite came from the northwest and was travelling south. A more complete account of this fall will be published later.

Two fireballs, reported by Mr. Latimer J. Wilson of Nashville, Tenn., were so remarkable that they were followed up. They appeared on June 27 and 29. Questionnaires were sent to likely places and several excellent replies were received. It is hoped that real heights may be calculated. If any reader has further information on these fireballs he is requestd to send it in. Dr. W. J. Fisher of Harvard is now at work on observations of several brilliant meteors that were seen in the northeastern part of the country during the early evening of August 11. He would be glad for further information from anyone who saw them.

All members are asked to make every effort to observe the Orionids which appear from October 15 to 27 every year. The maximum is about midway between these dates. The Orionids are especially important from several theoretical standpoints, and yearly observations are always needed.

Leander McCormick Observatory, University of Virginia.
1927 September 19.

COMET NOTES.

By G. VAN BIESBROECK.

At the time of writing there is only one comet under observation and it requires a fairly large telescope to be seen. It is COMET 1927 *d* found by Stearns in March of this year, an object which is remarkable by its large perihelion distance. During the summer months it has moved slowly in the constellation of Bootes, while gradually losing in brightness.

Circular 162 of the Copenhagen Observatory gives the following continuation of the ephemeris, computed by A. V. Nielsen from elements by B. Strömgren.

EPHEMERIS OF COMET STEARNS (1927 *d*).

1927 0^h U.T.	α h m s	δ ° ′
Sept. 28	14 42 29	+24 45.4
Oct. 2	46 15	48.8
6	50 6	53.2
10	54 3	24 58.7
14	14 58 5	25 5.2
18	15 2 12	12.9
22	6 24	21.8
26	10 40	32.1
30	15 1	43.9
Nov. 3	19 25	25 57.2
7	23 53	26 12.1
11	28 24	28.7
15	32 57	26 47.0
19	37 32	27 7.1
23	42 11	29.0
27	46 51	27 52.9
Dec. 1	15 51 32	+28 18.9

This shows that by November 1 the comet, still situated in the evening sky, will pass from Bootes into Corona Borealis, which it will have crossed by the end of the year. Conjunction with the sun comes on November 20 but, since the angular distance between comet and sun is then nearly 50°, observations will be possible without interruption. After November the object will be better seen in the morning sky but it will remain quite faint. The most recent observation here:

Sept. 21.06079 U.T. $14^h\,36^m\,0^s.05$ +24° 45′ 8″.8

showed it as a little coma, about 40″ in diameter with a well defined nucleus; the coma extended mostly in 80° thus still suggesting the presence of a short tail in that direction. The total brightness was estimated as $13^M.5$. From the position given we find the correction of the ephemeris for September 21 : — 13° and + 3′.8. Further observations will be possible for many months yet but they will require large instruments.

It is doubtful if further data will be obtained concerning the other comets found this year. I did not detect any trace of COMET 1927 *a* (BLATHWAYT) on plates exposed here on August 24. COMET 1927 *b* (REID) is now fairly well situated in the morning sky but since it was not recorded on plates taken here in March it must be considerably fainter than expected (14^M).

The discovery of COMET 1927 *f* by W. F. Gale at Sydney on June 7 has been reported previously. With the help of later observations from the southern hemisphere, A. C. Crommelin has computed the following elements and ephemeris (*British Astr. Assoc. Circ.* 55):

T = 1927 June 13.865 U.T.
ω = 209° 8′.21
Ω = 69 24.19 } 1927.0
i = 13 21.86
Log. q = 0.09997

1927 0^h U.T.	α h m	δ ° ′	Log. Δ
Sept. 30	23 39.6	—28 44	0.0410
Oct. 8	36.0	27 5	.0819
16	34.1	25 20	.1287
24	33.9	23 35	.1718
Nov. 1	35.2	21 50	.2138
9	23 37.8	—20 6	0.2546

showing that the comet can now be reached from northern observatories. However, a visual examination of the region by the writer on September 17 has not revealed the presence of the object, which is apparently quite faint by now.

Periodic Comet Encke will probably be announced as being again under observation before very long. Seagrave's ephemeris (p. 413) will be useful in this connection.

G. Merton gives the following search ephemeris for Periodic Comet Schaumasse which will be very difficult to detect in the low morning sky (*Copenhagen Observatory Circ.* 162). The positions are given under two different assumptions concerning the time of perihelion passage, which is uncertain by several days.

1927 U.T.	T = Sept. 27.0				T = Oct. 5.0			
	h	m	°	′	h	m	°	′
Sept. 23.0	10	30.4	+15	34	10	11.8	+16	29
Oct. 1	11	2.3	13	20	10	44.4	14	26
9	11	33.2	10	54	11	16.1	12	9
17	12	2.9	+ 8	23	11	46.8	+ 9	43

Merton's prediction places the time of perihelion at T = Oct. 1.54 (*Monthly Notices*, **87**, 565).

Williams Bay, Wis., 1927 Sept. 22.

Observation Notes from the Georgetown College Observatory.

Total Eclipse of the Moon, 1927, June 15.—The weather was rather hazy and very damp. No satisfactory observation of the time at which the moon entered the umbra was obtained but the beginning of totality was observed with the 12-inch refractor and recorded on the chronograph, the recorded time being $8^h\ 12^m\ 53^s$ U.T. Until shortly before totality the portion of the moon within the umbra was very dark, but at $7^h\ 55^m$ the whole surface of the moon became suddenly brighter and all the main configurations could be clearly discerned with a 3-inch telescope: this sudden brightening was probably due to some extent to a lessening of the haze at the place of observation, but this does not seem sufficient of itself to account for the entire change which may have been caused in part by variations of weather conditions along the sunrise-sunset region of the earth. The color of the eclipsed moon was almost pure grey no tinge of red or copper hue being noticed by two observers, though a third observer reported a slight ruddiness. Shortly after mid-eclipse the moon sank into thick haze near the western horizon and no observation of the end of totality was obtained.

Pons-Winnecke Comet.—This was visible in a small telescope and in field glasses for a considerable period before its nearest approach to the earth. The night of Sunday to Monday, June 26 to 27, was exceptionally clear and the comet was easily visible to the naked eye as a faint patch of light, resembling very much a detached portion of the Milky Way; this was the only time it was seen here without instrumental help.

Preparations were made to observe the occultation of Saturn on July 10, but clouds prevented all observations.

Washington, D. C., July 11, 1927.

COMMUNICATIONS.

Bright Meteor, light yellow, directly south from about 20 degrees up, shooting west of south. Vanished near horizon. Clear sky, moonlight. 8:15 P. M., C.S.T., July 8, 1927. H. W. GRIGGS.

6523 Wells St., Wauwatosa, Wis.

Meteor Observed.—On Sunday, June 26, at 8:22 P. M., while watching for the Pons-Winnecke Comet, with some friends, I saw a very large meteor moving almost due east in the constellation Aquila. This meteor burst three times, almost due south of Altair, with a vivid blue flame, which lit up the surrounding country much brighter than brightest moonlight, the middle explosion being the brightest. It was visible only about two seconds, and it left no trail.

Box 1232, Brownsville, Texas, June 28, 1927. EDMUND H. LEVY.

A Beautiful Fireball. —On the evening of June 6, at about 10:30 P. M., Central Time, I saw a very beautiful fireball. I was looking through my reflector at Saturn, when suddenly I was aware of a bright light overhead. Looking up, my eyes beheld a fireball of a brilliant yellow color about ten times brighter than Venus at maximum. It was travelling slowly and was a little west of Vega when it seemed to "sidestep" and then exploded. Red, yellow, green, and blue sparks darted from the object at all angles, ranging in length from 2 to 3 degrees. It fell about ten degrees farther, leaving a vivid red trail about one-half a degree wide, before it became invisible. The red trail lingered a few seconds as if reluctant to be extinguished. In short, this fireball resembled a large Fourth of July skyrocket that bursts into many colors. The fireball travelled north northeastward. The entire spectacle must have lasted 8 or 9 seconds. I was astonished at the slow speed at which this wonderful object travelled. I am not sure of the exact time and place of the fireball, because I was so absorbed in watching the display. CLYDE W. TOMBAUGH.

Burdett, Kansas.

A Correction and Note Concerning Jupiter.

Correction for the longitude in 5th row of longitudes for photographs of Jupiter in the August-September number is as follows: Substitute 189°.1 for 264°.4, for system I; 157°.6 for 84°.6, for system II. In the 4th row, substitute 103°.8 in place of 182°.1, for system I. Omit the concluding sentence in the 6th row. The red spot should not have been seen at the time the pictures were made.

At date of writing (September 22, 1927) Jupiter has several noteworthy changes compared with the aspect of the disk in 1926. A great disturbance has appeared in the north tropical zone, extending through an area of more than fifty degrees and resembling the former disturbance (1901-1925) in the south tropical zone. The north tropical dark area is associated with a very dark spot in the north equatorial belt, approximate longitude 121° on September 12 (system II), and terminates in a white loop in the north tropical zone, longitude 174°.7 (II) September 12, $6^h\ 50^m$ G.C.T.

The Red Spot is unusually conspicuous, photographically as well as visually. It was in longitude about 340°.9 (II), Sept. 18, 1927, and has a present rotation period of $9^h\ 55^m\ 35^s.530$. The darkest part of this spot seems about five degrees

farther south in latitude than in 1916 and consists of two condensations, one at the preceding end of the oval and the other at the following end. This also shows on photographs obtained with an 11-inch reflector.

1405 Gartland Ave., Nashville, Tenn. LATIMER J. WILSON.

A Correction.

To the Editor of POPULAR ASTRONOMY:

In speaking of the Royal Observatory at Capodimonte, Italy, in the article "The Astronomical Fraternity of the World" published in the March number of POPULAR ASTRONOMY, I stated (p. 159) "the Staff of the Royal Observatory consisted of the Director, Azegito Bemporad, and his cousin Guilio Bemporad." It has been brought to my attention that in this I was wrong. At that time—March, 1926—there were four astronomers and five computers upon the staff of that institution, and still more recently another astronomer has joined their ranks.

Fearful that the above erroneous statement might reflect unpleasantly upon those who are interested in that institution and its work, I beg you to publish this correction.

Of course, at the time of my visit, only the Director and his cousin were present, and the disadvantage of receiving my information from the Director in German—a language in the use of which neither of us excels—may well account for my misunderstanding of the situation.

August 27, 1927. DAVID B. PICKERING.

Watchers of the Night.—It is near midnight in early August. A soft wind from the farther Southlands steals through the night, fragrant with the odors of wild honeysuckle, hollyhock, daisy, and blue-bonnet—breath of the Texas prairies and woodlands. The love-song of a mockingbird mingles sweetly with the tinkle of a cowbell on a distant hillside. A dog barks at a neighboring farmhouse—a cock crows, announcing the hour.

The purple velvet of the sky is strewn thick with star-dust. Just west of the zenith blue Vega scintillates brilliantly—queen of the summer star-lands. Southward near the meridian, Altair marks the breast of the Eagle. The long tail of the Scorpion dips low to the southwestern horizon; and, eastward and higher, the suns of Sagittarius seem like gems caught in the mesh of the Milky Way. In the northeast Pegasus, Cassiopeia, and Perseus command attention with a brilliant display of white and blue and red suns. Westward they march, in resplendent glory.

Suddenly a streak of fire appears in the east and traverses the heavens, moving southward with amazing rapidity. And I, with an inward gasp of admiration for the beauty of the apparition, busy myself with ruler, notebook, and chart. In a few moments the path is plotted, the data recorded, and I lean back in my easy chair again with a sigh of satisfaction, knowing that I have made an observation that is truly worthwhile to the science that is mine.

This is a plea for meteor observers. There are thousands of amateur astronomers all over the world who could turn from aimless and desultory "star-gazing" to real observing by devoting a half-dozen or more nights each year to meteor work. Here is a vast, unexplored field—a field that is the amateur's own, for no instrumental equipment is necessary, no long years of mathematical training, no dignified abbreviations after one's name. The equipment and qualifications are simple: a fair knowledge of the constellations, a love of accuracy, a watch, a

ruler, some star-charts, and an easy chair. That is all—that, and the true love for science which is the incentive behind all research.

Amateurs! Anywhere, everywhere! The fact that you are an amateur is an asset in this work, rather than a liability. And, the address of the American Meteor Society is, The Leander McCormick Observatory, University of Virginia, Virginia.

1507 Denver Ave., Ft. Worth, Texas. STERLING BUNCH.

GENERAL NOTES.

Dr. H. Y. Benedict, Dean of the College of Arts and Sciences, Professor of Applied Mathematics and Astronomy, has been elected President of the University of Texas.

Latitude Variation Station.—According to information received from Professor Subbotin, of the Tashkent Observatory, a new station for the continuous observation of latitude variations is to be established at Kitab, in Turkestan, on the "International Parallel" (39° 8′ North). In 1899, six stations were established on this parallel by international co-operation. Owing to the war and other causes, three of them have been discontinued, leaving only three in operation at the present time. The new station at Kitab is about three hundred km east of the former latitude station at Tchardjui, and about 300 km southwest of the observatory at Tashkent. It will be under the charge of Professor Nefediev.

Extension Course in Astronomy.—Announcement is made of an extension course in Descriptive Astronomy to be given at the Astronomical Laboratory of Harvard University in Cambridge by Professor H. T. Stetson on Tuesday and Thursday evenings beginning October 4. The course is of particular interest to all teachers of science as emphasis will be placed upon the creative element in teaching and the use of new illustrative material for visualizing the subject. There will be opportunities for discussion and for observations with the telescope.

Astronomy for the Public.—The Astronomical Society of the Pacific has arranged two series of lectures for the coming season, one of six lectures at Culbertson Hall, Pasadena, and one of six lectures at the Public Library, Los Angeles. All of these are free to the public, although tickets, which may be obtained at the office of the Mount Wilson Observatory, will be needed for admission to all lectures in Culbertson Hall. All the lectures are to begin at 8:00 P.M. The subjects, dates, and lecturers are:

CULBERTSON HALL, PASADENA.

1. Sun Rays in the Service of Man, Thursday, Sept. 29, Dr. C. G. Abbot.
2. The Exploration of Space, Thursday, Oct. 27, Dr. E. P. Hubble.
3. Sun-Spots, Thursday, Nov. 17, Dr. S. B. Nicholson.
4. Stars in Action, Thursday, Dec. 15, Professor A. H. Joy.
5. How Stars are Made, Thursday, Jan. 26, Dr. H. N. Russell.
6. Our Planet Neighbors, Friday, Feb. 24, Dr. R. G. Aitken.

PUBLIC LIBRARY, LOS ANGELES.

1. Beyond the Milky Way, Thursday, Oct. 20, Dr. E. P. Hubble.
2. The Great Meteor of Central Arizona, Monday, Nov. 21, Dr. Mars Baumgardt.

3. Telescopes, Thursday, Dec. 15, Dr. F. G. Pease.
4. The Sun, Thursday, Jan. 19, Professor F. Ellerman.
5. The Solar System, Thursday, Feb. 23, Dr. R. G. Aitken.
6. Giant and Dwarf Stars, Thursday, March 23, Dr. F. C. Leonard.

BOOK REVIEWS.

The Fundamentals of Astronomy by Mitchell and Abbot, 300 pages, 5½x8½ inches, 98 illustrations and frontispiece. Van Nostrand Co., 1927, price $3.00.

The names of the authors will at once assure for this publication the interest of anyone at all familiar with the field of astronomy. This book is a revision, and a slight amplification, of "The Earth and the Stars" by the second of the above authors, which appeared in 1926. A comparison of the two books shows that they are fundamentally the same. There has been a more logical grouping of a number of topics, and in a few cases one chapter has been broken up into two. For example, a separate brief chapter has been given to "Comets and Meteors." The chapter on "The Calendar, Star Places, and Navigation," which formerly came between those on "The Sun" and "The Constellations," has been given a somewhat happier position following "The Motions of the Earth," and has been increased to a larger, though still brief, discussion of coördinates and time. Several plates which were out of their proper environment have been placed adjacent to the material descriptive of them. A number of foot-notes of the previous book have been placed in the body of the new text. An excellent feature of the revised text that will appeal especially to a student is the use of bold-faced type for the titles of the articles. The advisability of the change from the rough paper of the former text to glazed paper in the present one is questionable. The printed page is certainly more attractive, but the eye-strain, especially when reading under artificial light, is considerably increased. So much by way of comparison; now a word about the text itself.

The entire book is written in a delightful style and is in nearly every part not too technical to be read with keen enjoyment as well as rare profit by the general serious reader who desires accurate and up-to-date information about the wonderful heavens. He will enjoy the easy reading of the first two chapters on "How to Know the Stars" and "Some Famous Astronomers and Famous Instruments" and will continue with interest and without any great difficulty through most of the material in the following chapters on "The Earth," "Motions of the Earth," and "Time, the Calendar, Navigation." After 80 pages of the above he is then introduced to "The Moon and the Tides" in a brief 12-page discussion including an interesting article on "Power Derived from Tides" with a description of the contemplated tidal power project on the Bay of Fundy. This is followed by most readable chapters on "The Planets" and "Comets and Meteors." The next topic, "The Sun and its Spectrum," is presented in such a way that any earnest reader will readily grasp the idea of this more difficult section. The next two chapters, "Features of the Sun and Solar Eclipses" and "Heat, Power, and Life from Sun Rays" present their material in a very simple and entertaining manner. The remaining 110 pages of the text contain six chapters on the stars and will, in spots, be more difficult for the layman, especially the chapters on "Stellar Spectra" and "Interpretation of Spectra." The other chapters entitled

"Constellations, Charts and Catalogues," "Light of the Stars and their Distances," "The System of our Stars" and "Building the Universe" contain a wealth of up-to-the-minute information presented in such a way that it can be largely appreciated by any alert reader, and will, without any doubt, greatly widen his mental horizon.

In the preface the authors state, "It is felt that the book is suitable for elementary courses as given in the average university and college." The reviewer feels that in our crowded, intense curricula there should be included some brief, descriptive, scientific courses which allow the student to drink in readily a body of facts and an atmosphere that will greatly broaden his outlook and deepen his appreciation of the marvelous universe about him, and thus make no small contribution to his general culture. A brief course in astronomy is ideal for such a purpose—a course in which technical detail and mathematics are practically eliminated. For such a course the present text should prove excellent. For a more pretentious study, however, a text with more detail would be desirable.

A possible criticism of the text is that brevity has been carried a little too far in places, where a little fuller explanation would have added greatly to the understanding of the text. For example, to note a couple in the first chapter: on page 2 mention is made of the pole star without any further explanation about this object. It is surprising how many people do not know this star or how to find it. The Big Dipper, on the other hand, is very well known, and one sentence giving the location of the pole star by this familiar group would be a considerable help. Again, on page 2, ". . . planets . . . follow nearly the path of the sun and are therefore never far away from the plane of the ecliptic" would be much better understood were a few sentences inserted by way of explanation of what is meant by the plane of the ecliptic. A first chapter in which absolutely nothing need be taken for granted by the reader is a good tonic.

Another criticism is the use of the six plates depicting the circumpolar and the equatorial constellations. The smallness of the type used in these otherwise excellent plates is a real handicap. The reader would surely like to find, for example, Alpha Centauri, but he would have great difficulty in locating it—at least without the help of a reading glass. Indeed, it is only with considerable effort that the name of any first magnitude star can be read.

But the reviewer is not in a critical mood regarding this book as a whole. Frankly, he likes it very much—for the purpose mentioned above. Again, he feels that this text will be one of the best answers to that question so often asked by the intelligent, wide-awake, busy reader, who has had no previous experience in astronomy, "What good, up-to-date book can I get on astronomy that I can read and understand and enjoy?" Altogether the book is delightfully readable. Among many others, the following happy illustrations that will remain in the mind of the reader were noted during a rapid run over the pages: on page 4, "The naked eye stars that can be seen in one view of the heavens are, in fact, hardly more numerous than the people in a large, full theatre"; on page 213, "There are in our system about 20 stars for every human being now alive"; and on page 130, where the brightness of the sun is described as being 87 times as great as that of dazzling white molten steel. One cannot make even a hasty review of this book without being convinced that here is a piece of descriptive scientific work that has been well done.

H. R. Kingston.

University of Western Ontario, London, Ontario.